

**U.S. Army  
Corps of Engineers  
Fort Worth District**

## **PROJECT MANAGEMENT PLAN**

### **Sulphur River Basin Feasibility Study**

**Non-Federal Sponsor:**  
**Sulphur River Basin Authority**

# **Project Management Plan**

## **Sulphur –River Basin Feasibility Study**

This document outlines the Project Management Plan (PMP), which is prepared in accordance with Engineering Regulation (ER) 5-1-11 dated 17 August 2001, and ER 1105-2-100 dated 22 April 2000, for the Sulphur River Basin Feasibility Study.

This PMP has been developed as a cooperative effort by the Fort Worth District of the U.S. Army Corps of Engineers, the non-Federal sponsor (Sulphur River Basin Authority), and the non-Federal sponsor designees, currently consisting of the Tarrant Regional Water District, North Texas Municipal Water District, Upper Trinity Regional Water District, and the City of Irving. It describes the scope, schedule, and budget for accomplishing feasibility study tasks by including the following items:

- Project scope, including:
  - study authority
  - study area
  - study background
  - study objective
  - identification of non-Federal sponsor, non-Federal sponsor designees, and stakeholders
  - description of services to be provided
  - key products
- Project Delivery Team Identification
- Critical Assumptions and Constraints
- Work Breakdown Structure (WBS)
- Organizational Breakdown Structure (OBS) / Division of Responsibilities to be accomplished by the Fort Worth District and the non-Federal sponsor (and/or its designees)
- Funding Estimates
- Schedule
- Quality Control Plan
- Acquisition Strategy Plan
- Risk Management Plan
- Safety and Occupational Health Plan
- Change Management Plan
- Communications Plan
- Value Management Plan
- Closeout Plan

# 1. PROJECT SCOPE

## A. Study Authority

The authority for the study of Sulphur River is contained in a resolution by the Committee on Transportation and Infrastructure, United States House of Representatives, adopted March 11, 1998, as quoted below:

*“Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That the Secretary of the Army is requested to review the report of the Chief of Engineers on the Cooper Lake and Channels, Texas, published as House Document 488, 83<sup>rd</sup> Congress, 2<sup>nd</sup> Session, and other pertinent reports, to determine whether modifications are warranted to address water and related resources problems in the Sulphur River basin, Texas. Special emphasis shall be given to the need for flood damage reduction, environmental restoration and protection, and related measures to remove and control log jams on the Sulphur River, Texas, below Cooper Lake.”*

The authority granted by the resolution is known as a basin-wide authority. All studies conducted under this authority serve as an interim response to the basin-wide authority, and do not close out the granted authority.

## B. Study Area

The study area will encompass most of the Sulphur River Basin, though the focus will be on that portion of the basin upstream from the dam at Lake Wright Patman to the Cooper Dam on the South Sulphur River and to the headwaters of the North Sulphur River, near the proposed Ralph Hall Reservoir. The study area includes portions of Lamar, Delta, Hopkins, Franklin, Red River, Fannin, Hunt, Bowie, Cass, Morris and Titus County.

## C. Study Background

Beginning as early as the 1920's, private interests have channelized significant portions of the North Sulphur River. In the 1950's, as part of the Congressionally authorized Cooper Lake and Channels project, the USACE undertook to channelize additional portions of the South Sulphur and Sulphur Rivers. The USACE project was stopped due to legal action in 1971, and did not resume until the injunction was lifted in 1984. Meanwhile, with much of the channelization in place, which straightened the channels and eliminated many meanders and oxbows in the channel, significant increases in farming activities occurred, resulting in extensive clearing of much of the land adjacent to the channel. Severe erosion and siltation in the steeper channel also occurred. Combined with the material left from much of the clearing and farming efforts, a "logjam" began to form at the downstream limits of the halted channelization project. The heavy silt and debris load has continued to add to the logjam over the years such that it has completely blocked the main portions of the river channel shortly downstream from Highway 37. This blockage has severely impacted agricultural, environmental, and transportation interests in the basin. The immediate effects of the channelization and the logjam have been to severely alter the ecosystems of the Sulphur River and to create significant flood risk and damage to the area.

The USACE owns two major reservoirs in the basin. Wright Patman Lake is operated as a flood control lake, but is also a major water supply source for the City of Texarkana and the surrounding area. Jim Chapman Lake is a flood control lake in the upper portion of the basin that is also utilized as a water supply source for North Central Texas. In addition, with the completion of the Chapman project, 120,000 ac-ft of storage in Wright Patman was authorized for reallocation from flood control to water supply; however, appropriate environmental studies needed for implementation have not been performed to date. Furthermore, preliminary studies indicate the potential for development of significant additional water supply yield from further reallocation and operation of the Corps lakes through a systems approach.

In addition, because of the abundance of water in the region, the Sulphur Basin has been the focus of numerous studies regarding the possible development of new water supply projects. In 1997, the Texas Legislature passed Senate Bill 1, which divided the state into 16 Regional Water Planning

Groups (RWPG), each tasked with identifying future water demands, supplies and water management strategies for meeting anticipated supply deficits over a 50-year planning horizon. In January 2002, the Texas Water Development Board (TWDB) completed the 2002 State Water Plan, which is scheduled to be updated in 5-year planning cycles. In this approved plan, the North Central Texas region (Region C) identified a need for the development of a net 495,300 acre-feet per year of water supply yield from the Sulphur Basin available for use within Region C. Four potential reservoir sites were studied to provide this total amount of water to Region C. These sites included George Parkhouse I (North) and II (South) and Marvin Nichols I (North) and II (South). Based on this identified future need, Region C recommended development of a new reservoir, Marvin Nichols I, in the Sulphur Basin. The Marvin Nichols I site is hereafter referred to as Marvin Nichols in this document. The North East Texas region (Region D) plan supported the development of the Marvin Nichols reservoir as recommended in the Region C plan, provided a portion of the reservoir's yield remain in the North East Texas region. The expected yield of the reservoir varied from 550,800 acre-feet per year to 619,100 acre-feet per year, depending on operating assumptions for Wright Patman Lake, a Corps reservoir located downstream of the proposed Marvin Nichols reservoir. The Region C plan showed the yield to be 619,100 acre-feet and assumed a total of 20% (123,800 acre-feet) of the 619,100 acre-feet yield was reserved for use within Region D. The Upper Trinity Regional Water District is pursuing development of Ralph Hall Reservoir separate and apart from the additional 619,100 acre-feet identified as needed for this study.

## **D. Study Objective**

The purpose of the feasibility study is to: (1) develop and evaluate alternative solutions for flood damage reduction, ecosystem restoration, water supply, and other allied problems, needs and opportunities, and (2) provide a recommendation for project implementation.

### **1. Planning Objectives**

- a. Develop additional water supply by maximizing reallocation and/or operation modifications within existing Corps reservoirs, and/or identify building new supply reservoirs to meet needs, currently defined as 619,000 acre-feet of additional water supply yield to be obtained from the Sulphur River Basin in the 2002 State Water Plan, consistent with the requirement to identify the most economically and environmentally feasible alternative.
- b. Reduce flood hazards and associated flood damages within the Sulphur River study area for the period 2010-2060.
- c. Restore and preserve high quality habitat within the Sulphur River watershed study area.

### **2. Specific Problems and Opportunities**

Utilizing existing data, the following problems and opportunities have been identified within the Sulphur River study area:

#### Problems

- a. Additional water supply is needed for Region C.
- b. The combination of increased flow velocities due to previous straightening and channelizing efforts along the North Sulphur River, highly erodible riverbanks, and significant land clearing upstream of Highway 37 has created a massive accumulation ("logjam") of sediment and debris downstream of Highway 37.
- c. The loss of a steady water supply for the original meanders and oxbows within the North Sulphur River system has caused degradation of aquatic and bottomland hardwood habitat values in these areas.
- d. The erosive action caused by increased flow velocities in the river channel is likely to threaten the structural integrity of at least nine bridges spanning the North Sulphur River.
- e. The ever-expanding "logjam" causes increased sediment deposition and flooding hazards in the surrounding area. A one-mile stretch of Highway 37 is impassable during frequent flood events; furthermore, continued sediment deposition will eventually overtop this bridge, necessitating its replacement at a higher elevation.

- f. Periodic breaching and overtopping of levees occurs within the study area, necessitating costly repairs.
- g. The duration of floodwater inundation on adjacent agricultural property, due to the inability of the lands to drain to the river because of river sedimentation, necessitates pumping of floodwaters from these lands. The latest flood necessitated pumping at a cost of up to \$200,000. Consequently, crop production has decreased while production costs have increased.
- h. Continual deposition of sediment has covered existing bottomland hardwood areas, significantly degrading the value of the habitat for wildlife. The combination of flooding frequency, inundation depths, and disturbance from continual sediment deposition has kept the bottomland vegetation in the area at a low successional level, dominated by willows and cottonwoods instead of the historically native water oak-elm-hackberry forest association. These factors have led to a significant loss and degradation of the bottomland hardwood ecosystem within the watershed.
- i. Water quality within the basin has deteriorated, resulting in Wright Patman Lake being placed on the State's list of impaired water bodies.

#### Opportunities

- a. Development of an additional water supply yield of 619,000 acre-feet per year from the basin, as identified in the 2002 Texas State Water Plan. The largest water management strategy affecting the Sulphur Basin in the State plan included development of the Marvin Nichols I reservoir. Other potential new reservoirs were also considered by the regional water planning groups during the planning cycle, including George Parkhouse I and II, and Marvin Nichols II.
- b. Restoration of high quality aquatic resources along approximately 34 river miles of old North Sulphur River oxbows by facilitating water flow back into the system.
- c. Reforestation of bottomland hardwoods and associated shrub species in selected areas between the old river channel and the constructed channel along the North Sulphur River.
- d. Minimization, or elimination, of erosive action within the North Sulphur River system and subsequent sediment deposition at the "logjam" downstream of Highway 37.
- e. Reduction of flood frequency, depth and duration of flood inundation, and flood damages on surrounding properties, including Highway 37, caused by the "logjam".
- f. Application of habitat improvement and forest management techniques to protect the habitat values of the existing resources and to improve the quality to the highest extent practicable over the long-term.
- g. Establishment of partnerships with other Federal, State and local agencies, such as the Natural Resource Conservation Service, the local Extension Service, and Texas Forest Service to educate and work with local land owners to improve land management and land-use practices that may have exacerbated the erosion, flooding, and water quality problems now being experienced in the Sulphur River watershed (e.g., clearcutting of timber, leaving timbering debris adjacent to streams and rivers which may enter the river system during flood events, poor maintenance of farm levees, property damage caused by feral hog populations, timbering or farming to the channel edge without leaving a vegetated buffer, etc.).

### **E. Identification of Sponsor, Sponsor Designees, and Stakeholders**

The non-Federal sponsor for the feasibility study is the Sulphur River Basin Authority (SRBA). The current non-Federal Sponsor Designees are the Tarrant Regional Water District, North Texas Municipal Water District, Upper Trinity Regional Water District, and the city of Irving. Stakeholders for the study include, but are not limited to, State and Federal resource agencies; Texas Water Development Board; local landowners; timber companies; municipalities and water districts.

## **F. Description of Services to be Provided**

A detailed scope for this study is contained in Appendix A. The work is broken into major categories as defined by the Corps' standard Civil Works Work Breakdown Structure (WBS). The work can largely be summarized in more simple terms below:

1. Phase I – Develop, compile, and interpret data to determine baseline conditions with respect to hydrology and hydraulics; economic flood damages; socioeconomic conditions; geology; environmental resources; cultural resources; recreation; and public desires, in sufficient detail to allow for feasibility level evaluation of alternative plans..
2. Phase II - Develop and evaluate structural and nonstructural flood damage reduction alternatives; ecosystem restoration alternatives; and, reallocation and/or operation modification alternatives for existing water supplies and/or for any new water supply reservoirs identified in item 3. below, including impact assessments and determination of costs and benefits for each.
3. Phase II - Develop a detailed water storage/yield analysis for Wright Patman Lake. Conduct an economic analysis to determine reallocation feasibility. Develop additional alternatives to include, but not be limited to, the development of new reservoirs within the basin; combinations of varying amounts of reallocation and new reservoir sites; and system operation of reservoirs. Develop the cost to the user for each of the alternatives investigated. These costs are likely to include, but not limited to, treatment and transmission; intakes, pipelines and pump stations; relocation of utilities, roads and recreation facilities; mitigation for adverse impacts to environmental and cultural resources; real estate acquisition; and operations and maintenance.
4. Phase II - Identify the National Economic Development (NED) Plan; National Ecosystem Restoration (NER) Plan; Combined NED/NER Plan; Locally Preferred Plan (LPP); and, Recommended Plan.
5. Phase III - Design the Federal Plan (NED, NER, or NED/NER) and the Recommended Plan in sufficient detail to obtain an accurate determination of the baseline implementation cost estimate.
6. Phase III - Document and process the analysis and findings to meet National Environmental Policy Act (NEPA) requirements, and for submittal to Congress for project authorization.

## G. Key Products

The three-phased study approach allows for the development of progressively detailed draft reports within each phase. This approach also establishes checkpoint milestones at the end of each phase, which will include coordination with higher Corps headquarters to ensure ongoing concurrence with study decisions and direction. These interim reviews are intended to expedite the review and approval process following completion of the Draft Feasibility Report. The key products to be completed during this study, broken down by study phase, include:

1. **Existing / Future Without-Project Conditions Analysis**. This draft report will document the findings from Phase I, and will be submitted to higher Corps headquarters for review, in anticipation of a Feasibility Scoping Meeting (FSM).
2. **Feasibility Scoping Meeting Guidance Memorandum**. This document will annotate review comments and responses; discussions at the FSM; and required actions for continuation of the feasibility study.
3. **Plan Formulation Report**. This draft report, which will be a continuation of the Existing / Future Without-Project Conditions Analysis, will document the analysis and findings from Phase II of the feasibility study, including the tentative selection of the Federal Plan and Recommended Plan. This report will be submitted to higher Corps headquarters for review, in anticipation of an Alternative Formulation Briefing (AFB).
4. **AFB / Project Guidance Memorandum (PGM)**. This document will annotate review comments and responses; discussions at the AFB; and required actions for completion of the Feasibility Report.
5. **Draft Feasibility Report / NEPA Documentation**. This document will contain the completed investigations, analyses, and recommendations developed during the Feasibility Study. Successful resolution of policy compliance issues at the AFB will allow the Draft Feasibility Report to be submitted for concurrent Washington level policy compliance review and public review.
6. **Final Feasibility Report / NEPA Documentation**. Following final policy compliance and public review, the final report will be submitted to the Southwestern Division (SWD) for approval.
7. **Division Engineers Notice**. This public notice documents SWD approval of the report. The report is then submitted to Headquarters, U.S. Army Corps of Engineers (HQUSACE) for final review and approval. Subsequent to publishing of the Division Engineers Notice, a Design Agreement can be executed for initiation of construction documents, including plans and specifications.
8. **Chief of Engineers Report**. This report documents HQUSACE approval of the Feasibility Report and is submitted to the Office of the Assistant Secretary of the Army for Civil Works (OASA(CW)). The report is subsequently submitted to the Office of Management and Budget (OMB), with eventual submission to Congress for implementation authorization.
9. **Record of Decision**. This document, signed by the ASA(CW), signifies the conclusion of environmental analyses and identifies the conclusions set forth in the Environmental Impact Statement (EIS).

## 2. PROJECT DELIVERY TEAM IDENTIFICATION

Table 1 identifies the expected Project Delivery Team (PDT) members.

**Table 1**  
**Project Delivery Team Members**

<b>PDT Member</b>	<b>Organization</b>	<b>Discipline</b>
Kevin Craig	USACE	Project Manager
Mike Burke	Sulphur River Basin Authority	Sponsor
Woody Frossard	Tarrant Regional Water District	Sponsor Designee
Robert McCarthy	North Texas Municipal Water District	Sponsor Designee
Larry Patterson	Upper Trinity Regional Water District	Sponsor Designee
Todd Reck	City of Irving	Sponsor Designee
Stephen Pilney	USACE	Reservoir Control
Craig Loftin	USACE	Hydrology & Hydraulics
Efren Martinez	USACE	Civil Design
William Sanner	USACE	Structural Design
Steven Chen	USACE	Geotechnical Design
Thurman Schweitzer	USACE	Real Estate
Nancy Parrish	USACE	Cultural Resources
Billy Colbert	USACE	Environmental Resources
William Crump	USACE	Hazardous, Toxic and Radiological Waste
Jodie Foster	USACE	Economics
Grady Clay	USACE	Lake Recreation
Susan Robinson	USACE	Natural Resources
Ed Rivera	USACE	Public Affairs
Sharon Hair	USACE	Contracting
Terry Alger	USACE	Program Analyst

### **3. CRITICAL ASSUMPTIONS AND CONSTRAINTS**

#### **A. Assumptions**

1. Aerial maps proposed to be generated by the Farm Service Agency and the Texas Natural Resources Information Service (TNRIS) will be sufficient and available in time for use in all phases.
2. Two foot contour maps will be sufficient for hydraulic modeling, identification of all significant structures, and the review and analysis of environmental concerns. They will also be appropriate for the preliminary design elements of future phases. No specific survey for finished floor slab elevations or other structures, other than for field verification of the contour map, will be required.
3. Existing multi-spectral imaging will be sufficient for Phase I efforts.

#### **B. Constraints**

1. Adverse impacts to the White Oak Creek Mitigation Area (WOCMA) due to identified alternatives for reallocation or any other purpose will be minimized to a degree that is acceptable to Federal and State resource agencies. Close coordination with the Texas Parks and Wildlife Department (TPWD), who manages the WOCMA, will be maintained throughout the study.
2. For the reallocation portion of this study, alternatives to reallocation will initially be limited to opportunities/alternatives within the Sulphur River basin. However, if a federal action for reallocation is identified as a potentially recommended plan, additional water supply alternatives outside the basin will be also be investigated for comparison purposes prior to a final recommendation for authorization.
3. This study will address the availability of water supply in the basin, not any allocation of the water supply among potential users. The water rights and contractual issues involved in these matters are a non-Federal responsibility, and are beyond the scope of the study

### **4. WORK BREAKDOWN STRUCTURE (WBS)**

The Work Breakdown Structure (WBS) is a product-oriented hierarchy of the scope of work, and is divided into component products and sub-products. The WBS listed in Appendix D is based on the standard Corps Civil Works WBS and follows the definition of major tasks, tasks, and sub-tasks defined in the Scope of Work (SOW). The WBS is intended to summarize the entire work effort and is an outline of the specific tasks that are to be accomplished to produce the feasibility study products. The WBS follows a consistent set of accounting codes. The accounting codes of the WBS are intended to allow products, tasks, cost, and schedule to be tracked with easy reference throughout the feasibility phase. The WBS closely follows the accounting system for Corps of Engineers Civil Works projects. This allows the Corps of Engineers Financial Management System (CEFMS) and the Project Management Information System (P2) to directly accept cost data for projects established using the Civil Works Work Breakdown Structure.

Table 2 includes the initial WBS for the proposed feasibility study. The WBS will be expanded to include more detail tasks as the project scope is defined.

**Table 2  
Work Breakdown Structure**

<b>WBS Code</b>	<b>WBS Name</b>
<b>00500</b>	<b>Project Management Plan (PMP)</b>
<b>21000</b>	<b>Recon / Sec 905(b) Studies</b>
21V00	Feasibility Study Cost Sharing Agreement (FCSA)
<b>22000</b>	<b>Feasibility Studies</b>
22T00	Feasibility Programs & Project Management
22P00	Engineering and Design / Cost Estimating
22C00	Socio/Economics
22H00	Real Estate
22E00	Environmental
22F00	Fish and Wildlife Coordination
22L00	HTRW Studies
22D00	Cultural Resources
22A00	Public Involvement
22R00	Plan Formulation
22S00	Feasibility Report
22M00	All Other Feasibility Activities
22Q00	Management Documents
<b>30DG0</b>	<b>Design Agreement</b>
<b>30B00</b>	<b>Design Documentation Report</b>
<b>30AP0</b>	<b>Project Cooperation Agreement</b>
<b>30AQ0</b>	<b>Project Escrow Agreement</b>
<b>30D00</b>	<b>Construction Engineering and Design</b>
<b>31000</b>	<b>Supervision &amp; Administration (S&amp;A)</b>

## **5. ORGANIZATIONAL BREAKDOWN STRUCTURE (OBS)**

The Organizational Breakdown Structure (OBS) identifies which organization has responsibility or input for completing each feasibility study task. In addition to identifying task responsibilities, the OBS section includes mechanisms for ensuring proper coordination among the Federal and non-Federal study team members involved in conducting the feasibility study.

### **Organizational Work Responsibilities**

The Organization Breakdown Structure (OBS) describes the responsibility of each organization in providing input to and/or completing tasks identified in the Scope of Studies and Work Breakdown Structure. The following paragraphs identify the management and technical responsibilities for the study. Three levels of management responsibility will be used to guide development of the study: the Executive Committee, the Project Review Boards (PRB), and the study management team. This management structure will be formalized in the Feasibility Cost Sharing Agreement (FCSA). Responsibilities for performing the technical feasibility study investigations are identified following the description of the management structure.

#### **Executive Committee**

As indicated in the Feasibility Cost Sharing Agreement (FCSA), management of the overall study is the responsibility of the Executive Committee, which will be comprised of the Fort Worth District Engineer; the Deputy District Engineer for Programs and Project Management; the non-Federal Sponsor and the non-Federal Sponsor Designees. The Executive Committee will meet throughout the study to review

study progress, finances, and findings as developed and reported by the study management team. The non-Federal Sponsor and the non-Federal Sponsor Designees will be equal partners with the Corps representatives on the Executive Committee. The District Engineer, the non-Federal Sponsor, and the non-Federal Sponsor Designees will co-chair the committee. The Executive Committee will manage the overall study by: maintaining a working knowledge of the feasibility study; assisting in resolving emerging policy issues; ensuring that evolving study results and policies are consistent and coordinated; directing the study management team; and, reviewing and approving decisions made by the study management team.

The Executive Committee will participate in Issue Resolution Conferences (IRCs), which include the Feasibility Scoping Meeting (FSM), the Alternative Formulation Briefing (AFB), the Feasibility Review Conference (FRC), and additional IRCs as required. The committee is also responsible for resolving any disputes that may arise during the study. The committee will agree on solutions and study direction, which may include study termination. At least two IRC's will be held prior to the public distribution of the Draft Feasibility Report to ensure that all issues are resolved before the final report is submitted to higher authority. Additional IRCs will be held, as required, throughout the study to resolve any problems that may arise. As detailed in the FCSA, the Executive Committee must approve any significant amendments to the FCSA. Significant changes are defined as any modification to the FCSA which increases the total study costs by more than 15 percent. They must also approve any reassignment of work items between the non-Federal sponsor and the Federal government. The Executive Committee is also responsible for decisions on whether to suspend or terminate studies under conditions of the FCSA. The committee will also resolve any disputes which are not resolved by the study management team and will appoint representatives from their respective organizations to serve on the study management team.

### **Project Review Boards (PRBs)**

PRBs have been established at three levels within the Corps of Engineers to evaluate the status and progress on all studies, projects, and programs. One PRB includes HQUSACE. The HQUSACE PRB is chaired by the Director of Civil Works, or his designee, and includes the chiefs of the elements whose functions are integral to the USACE role in civil works project development. The HQUSACE PRB will review the study only if it determines that it needs intensive management at that level or if recommended by the SWD PRB. The HQUSACE PRB will facilitate resolution of major study issues, concerns, or problems through Corps functional channels and make recommendations to the Director of Civil Works, SWD, the non-Federal Sponsor, and the non-Federal Sponsor Designees as part of intensive management. Upon receipt of a Schedule and Cost Change Request (SCCR), the HQUSACE PRB will approve changes in major milestones and significant cost increases in accordance with Engineering Regulation (ER) 5-7-1. The HQUSACE PRB will meet bimonthly. The second PRB will be chaired by the SWD Commander, or his designee, and include the chiefs of the elements whose functions are integral to the role of the Division in civil works projects. The SWD PRB will review monthly the project executive summary (PES) for compliance with the PMP and provide comments to the District. The SWD PRB will facilitate resolution or elevate to the Division Commander or higher authority major issues raised during the study, monitor study contingencies and cost changes against the approved study cost estimate, and take appropriate action on schedule and cost change requests, in accordance with ER 5-7-1. A third PRB will be held by the Fort Worth District and chaired by the District Commander, or his designee. It will include the chiefs of the elements whose functions are integral to the role of the District in civil works projects. The District PRB will review the PES report monthly (along with all others for the District) for compliance with the PMP and provide comments to the Division and the project manager. The District PRB will facilitate resolution or elevate to SWD major issues raised during the study, monitor study contingencies and costs of changes against the approved study cost estimate, and take appropriate action on SCCR, in accordance with ER 5-7-1. The District PRB also will approve the PMP and any significant changes identified by the study management team and recommended by the project manager in accordance with ER 5-7-1. The non-Federal Sponsor and non-Federal Sponsor Designees may attend the District PRB meetings at their discretion.

## **Study Management Team**

The study management team will include representatives from the Corps of Engineers, the non-Federal Sponsor, the non-Federal Sponsor Designees, and other agencies, as appropriate. This team will ensure appropriate scopes of services for the technical studies, guide their accomplishment, and participate in plan formulation and selection of potential alternatives. The team will be directly involved in establishing mutual roles for the study management team members and in focusing feasibility investigations on the critical issues. Corps of Engineers representatives will include the Project Manager. The team will recommend to the Executive Committee the tasks to be conducted and the extent of planning and evaluation to be carried out in the feasibility phase. The team will also report to the Executive Committee and PRB on the results of studies and recommend alternative courses of action for project implementation. Study management team meetings will be held regularly throughout the feasibility phase. Meetings will be held at approximately one-month intervals, but may be more frequent at critical decision points.

## **Programs and Project Management Division (PPMD)**

The PPMD will assign a Project Manager (PM) to be responsible for reporting to the Project Review Board and to prepare required Life Cycle Project Management (LCPM) reports. In addition, the PM will be responsible for public involvement, preparing study schedules, monitoring project schedules and finances, processing schedule and cost change requests (SCCR), reviewing budget documents, coordinating preparation of the Project Cooperation Agreement (PCA), and identifying and resolving problems and issues. The PM will be the main point of contact (POC) for all matters relating to the project.

## **Engineering Division (EC)**

The Engineering Division Technical Manager will be responsible for managing the Engineering Division contribution to the feasibility study, coordinating efforts of the study team, plan formulation, monitoring the progress of technical work, and developing and preparing the feasibility Report. This effort includes coordinating with the Project Manager regarding the status of project schedules and finances. The Design Branch will be responsible for developing designs and drawings, structural investigations, and conducting hydrologic and hydraulic design studies. The Cost Engineering Section will be responsible for developing cost estimates for initial construction and operation and maintenance of alternative plans, and the selected plan.

## **Planning, Environmental and Regulatory Division (PER)**

The Planning Branch will be responsible for developing structure inventories, collecting information on depth-damage relationships, coordinating with the Engineering Division to obtain water surface elevations for various flood events throughout the damage reaches, developing economic data and demographic information, developing the financing plan, and for all Geographical Information System (GIS) work efforts. The Environmental Resources Branch will be responsible for assessing environmental impacts, evaluating cultural resource impacts, and accomplishing NEPA compliance activities.

## **Real Estate Division (RE)**

The Real Estate Division will be responsible for performing all required real estate activities for the project. Real Estate activities will include determining land ownership, developing the real estate gross appraisal, and preparing the real estate plan which will include a baseline cost estimate for real estate, development of a detailed schedule of acquisition milestones, and a general description of the area and total acreage to be acquired, with fee and easement breakdown. The Appraisal Branch will prepare gross appraisals. The Acquisition Branch will obtain rights-of-entry. The Planning and Control Branch will prepare preliminary real estate acquisition maps and prepare the Real Estate Supplement. The Real Estate Division will also prepare the physical takings analysis and the preliminary attorney's opinion of compensability.

## Non-Federal Sponsor and Non-Federal Sponsor Designees

The non-Federal Sponsor and the non-Federal Sponsor Designees will be involved in all aspects of the feasibility study to ensure that they agree with the findings of the study. The non-Federal Sponsor and the non-Federal Sponsor Designees will attend progress meetings, public workshops; provide scientific/technical input to field studies; participate in the plan formulation process; assist in the development of recommended plans; and review reports.

### Other Study Participants

Numerous agencies/organizations will be consulted throughout the study for their input.

## 6. FUNDING ESTIMATES

This section of the PMP presents the cost estimate for the feasibility study, as shown below. Table 3 shows the Federal contribution and the non-Federal contribution, including cash and work-in-kind (WIK) services, by Federal Fiscal Year. Detailed cost estimates are listed in Appendix B.

**Table 3**  
**Cost Apportionment by Fiscal Year**

	Phase I		Phase II		Phase III	
	FY06	FY07	FY08	FY09	FY10	
Federal	\$ 910	\$ 890	\$ 860	\$1,330	\$460	
Non-Federal	\$ 910	\$ 890	\$ 860	\$1,330	\$460	
(Cash)	\$ 0	\$ 90	\$ 260	\$ 730	\$300	
(WIK)	\$ 910	\$ 800	\$ 600	\$ 600	\$160	
<b>Total</b>	<b>\$1,820</b>	<b>\$1,780</b>	<b>\$1,720</b>	<b>\$2,660</b>	<b>\$920</b>	

## 7. SCHEDULE

This section of the PMP defines the schedule for completion of major milestones and tasks for use in monitoring the progress of the feasibility study. The detailed feasibility study schedule includes all critical study tasks, inter-relationships between tasks, key decision points, in-progress reviews, and issue resolution meetings, and is included in Appendix C.

SEQUENCE	MILESTONES	DATES
P-1 Milestone	Execution of FCSA Modification	15 Feb 2005
P-2 Milestone	Start Feasibility	1 Oct 2006
P-3 Milestone	Complete Phase I	30 Apr 2007
P-4 Milestone	Feasibility Scoping Meeting	15 Jun 2007
P-6 Milestone	Modify PMP / FCSA	15 Jul 2007
P-7 Milestone	Complete Phase II	15 Aug 2009
P-7 Milestone	Alternative Formulation Briefing	30 Sep 2009
P-8 Milestone	Project Guidance Memorandum	15 Oct 2009
P-9 Milestone	Submission of Draft Feasibility Report	30 May 2010
P-10 Milestone	Public Review Period Start	1 Jun 2010
P-11 Milestone	Division Commander's Notice	15 Sep 2010
P-12 Milestone	Submission of Final Feasibility Report	30 Sep 2010

## **8. QUALITY CONTROL PLAN**

The Fort Worth District is responsible to ensure that the report conforms to all current professional practices and standards by conducting an independent technical review prior to its submission to the Southwestern Division (SWD) and Washington-level Headquarters (HQUSACE). Policies and procedures defining the quality control / internal technical review process are specified in EC 1165-2-203, "Technical and Policy Compliance Review". Quality Control measures and objectives are listed in Appendix D.

## **9. ACQUISITION STRATEGY PLAN**

Work efforts identified in this PMP will be accomplished through a combination of in-house Corps staff, private sector contractors, non-Federal Sponsor, non-Federal Sponsor Designees, and stakeholders. The non-Federal Sponsor in consultation with the non-Federal Sponsor Designees will maximize work-in-kind opportunities, utilizing private sector contractors and in-house management staff.

## **10. RISK MANAGEMENT PLAN**

Safety and health risks are considered very low since most activities will be accomplished within the office environment.

While changes in scope, schedule, and costs will most probably happen to one degree or another, check points have been established at the end of Phase I and Phase II for the non-Federal Sponsor, the non-Federal Sponsor Designees, and the Corps to analyze change requirements and to rescope, reschedule and recost the remaining study efforts. Workshops will be utilized (see Value Management Plan) to identify changes and to provide impetus to revisions to the PMP. In addition to the two scheduled check points, monthly coordination meetings will be held to discuss study scope, schedule and costs, and their impacts on quality. Changes to this PMP can be incorporated at any time and at either party's request.

## **11. SAFETY AND OCCUPATIONAL HEALTH PLAN**

This section of the Project Management Plan (PMP) assures that all work will be performed according to the District Safety Plan that follows the Corps Safety Manual, EM 385-1-1. The safety policy of the District is to provide a safe and healthful work environment for all employees and contractors. This plan identifies and eliminates occupational hazards that may endanger work materials, equipment, and personnel. Supervisors shall conduct on-the-job safety meetings and job hazard analysis for their personnel to further educate them on safe practices.

## **12. CHANGE MANAGEMENT PLAN**

Planning is an iterative process without a predetermined outcome. Scope, schedule and cost of the study may require adjustment during the course of the investigations. Changes in scope could/will occur as technical challenges become more defined.

The management of this project will be accomplished under the methods and procedures of the Project Management Business Processes as detailed in ER 5-1-11. Consistent with these guidelines, the PM is responsible for managing the project scope, quality, cost, budget and schedule; facilitating actions to resolve potential or existing issues, and reporting the status of the project to the non-Federal Sponsor and the non-Federal Sponsor Designees and higher authorities. The PM serves as the principle responsible authority for project change coordination.

All significant changes in scope, critical assumptions, methodologies, work-in-kind, and level of detail for study components that affect the schedule and/or study costs will require mutual agreement between the Corps, the non-Federal Sponsor (Sulphur River Basin Authority) and the non-Federal Sponsor Designees.

This study is to be conducted in three phases. At the conclusion of each phase, major decisions are expected to be made based on results from the previous phase. All study participants are expected to reevaluate study direction, costs and objectives.

The project manager will ensure all significant changes are documented and distributed to all involved parties for signature agreement.

### **13. COMMUNICATIONS PLAN**

The feasibility study will require input from many different work elements, including the non-Federal Sponsor, non-Federal Sponsor Designees, contractors/consultants, and other government agencies. Proper coordination among these study participants is essential to maintain the project schedule; to avoid duplication of efforts; to detect issues before they become problematic; and to maintain agreement and cooperation on the direction of the study.

Due to geographically dispersed locations of study participants, communication among study participants is expected to be conducted, but not limited to, email, telephone, meetings, or other forms of electronic/traditional means. All study participants are expected to strive toward open communications.

#### **A. Internal (Corps) Coordination**

Internal coordination mechanisms will be used to ensure that effective internal command, control, and coordination is maintained during the feasibility study. The primary internal coordination mechanisms will be the monthly Project Review Board (PRB) meetings, monthly meetings of the Project Delivery Team, and Issue Resolution Conferences (if necessary) scheduled at critical phases of the study.

A work plan will also be developed on an annual basis which reflects anticipated funding levels and work efforts, based on the PMP. The District PRB will review monthly the Program Executive Summary (PES) report for compliance with the PMP and provide comments to the Division and the Project Manager. The plan will include reports on study progress to date, a schedule for the efforts planned for the coming year, specific work tasks required to complete investigations, estimates of costs from each work group, and other pertinent information. The Executive Committee will approve the annual work plans.

The Study non-Federal Sponsor and non-Federal Sponsor Designees are encouraged to attend these monthly Project Review Board meetings.

#### **B. External Coordination Mechanisms**

Coordination outside the Corps of Engineers, the non-Federal Sponsor, and the non-Federal Sponsor Designees will be necessary to ensure the success of the feasibility study. Communication/dissemination of information between the Corps, the non-Federal Sponsor, and the non-Federal Sponsor Designees will be through monthly status reports and Project Delivery Team meetings. Communication protocols will be similar for all other study participants, such as the U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (EPA), Advisory Council on Historic Preservation (ACHP), U.S. Fish and Wildlife Service (USFWS), State Historic Preservation Officer (SHPO), the State of Texas, and others, as required.

##### **1. Public Meetings/Workshops**

These gatherings will be scheduled throughout the study period to gather input, report on study progress, or to report study findings. The Project Manager, in coordination with the non-Federal Sponsor and the non-Federal Sponsor Designees, will arrange for and report on public meetings/workshops.

## **2 Study Briefings and Fact Sheets**

The Project Manager will prepare and provide study briefings and fact sheets throughout the study period for congressional representatives, state and local officials, and others, as appropriate.

### **C. Project Delivery Team (PDT) Meetings**

All meetings or phone conversations where decisions or agreements are made shall be documented. Meeting minutes shall be taken by at least one meeting participant. Meeting minutes will reflect actual conversations during the said meeting only.

## **14. VALUE MANAGEMENT PLAN**

Quality is planned for and built into the planning process which provides structure to these studies, and organized and monitored through the quality management plan contained herein. An integral part of such quality management is the management of the projects associated values. Value management is a process to facilitate and encourage the understanding, consideration, and integration of the needs of all customers, team members, sponsors/partners, and stakeholders. Value Management seeks the highest value for a project by balancing resources and quality.

Public Law and OMB directive require value engineering during planning and design of water resources projects. Consequently, the Corps of Engineers' policy is to conduct a value engineering study on all large projects with a estimated cost of \$2,000,000 or greater. In response to this requirement, the Project Delivery Team has determined that in view of the scope of this interim feasibility study, the probable recommended alternatives, and the level of engineering and cost estimation that will be conducted, the value engineering study will be delayed until the initial phase of subsequent preconstruction engineering and design.

While a value engineering study focuses mainly on cost savings by adjusting project designs through synergistic interaction of a multi-disciplinary evaluation team, there are techniques that can be integrated into the planning process to assure overall value is maintained into the final Interim Feasibility Report. One of these techniques, the workshop, will be utilized at the end of Phase I and at the end of Phase II to assure focus is being maintained on the needs and objectives set forth in this document and shared by the non-Federal Sponsor, non-Federal Sponsor Designees, the Corps of Engineers and stakeholders. The Fort Worth District's Value Engineer will plan and facilitate these two PDT workshops. These workshops will result in changes revisions to this PMP, if deemed appropriate.

## **15. CLOSE OUT PLAN**

Closeout activities are very important and determine the clients' final impression of the Corps' project delivery process. All Project Delivery Team members must be held accountable for their part in the closeout of a project. Although many dependent actions are required by various members of the project team, Project Managers are ultimately responsible for total project management, monitoring all project products and ensuring that all the actions are accomplished in accordance with the Corps' Project Management Business Process and ER 5-1-11 for the successful closeout of projects and meeting the clients' requirements. The close out plan identifies all elements appropriate for this project, and is identified in the Project Schedule in Appendix C.


## **16. ACRONYMS**

A listing of the acronyms used in this PMP and commonly used in Corps documents is provided in Appendix E.

**PROJECT MANAGEMENT PLAN AGREEMENT  
SULPHUR RIVER BASIN FEASIBILITY STUDY**

**Statement of Agreement**

We, the undersigned, affirm our acceptance and approval of the Project Management Plan (PMP), and agree to abide by the provisions herein.

  
\_\_\_\_\_  
Marcia Hackett, COE


  
\_\_\_\_\_  
Mike Burke, SRBA

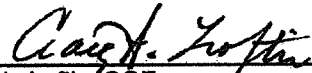
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Woody Frossard, TRWD

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Robert McCarthy, NTMWD


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Larry N. Patterson, UTRWD

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Todd Reck, City of Irving

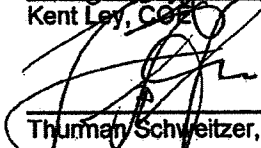
  
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Stephen Pilney, COE


  
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Craig Loftis, COE

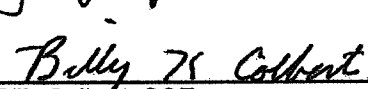
  
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Kent Ley, COE

  
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Steven Chen, COE

  
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Thurman Schweitzer, COE


  
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Nancy Parrish, COE

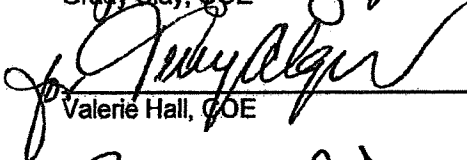
  
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Billy Colbert, COE

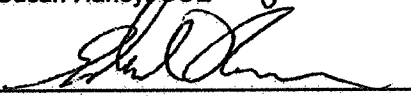
  
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William Crump, COE

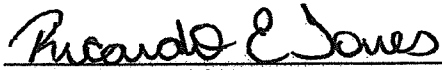
  
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Jodie Foster, COE

  
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Grady Clay, COE

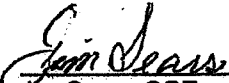
  
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Susan Haney, COE

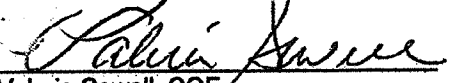
  
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Valerie Hall, COE

  
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Ed Rivera, COE

  
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Ricardo Torres, COE

  
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Larry Thornton, COE

  
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Jim Sears, COE

  
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Valerie Sewell, COE

  
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Presley Hatcher, COE


**PROJECT MANAGEMENT PLAN  
SULPHUR RIVER BASIN FEASIBILITY STUDY  
CERTIFICATION OF REVIEW AND APPROVAL**

**Endorsement by Office Chiefs**

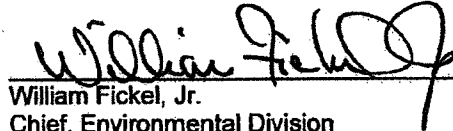
My Fort Worth District staff and I have reviewed the Project Management Plan as developed by the Project Delivery Team. I endorse the Project Management Plan and recommend its approval and initiation.

  
Michael J. Mocek, P.E.  
Chief, Programs and Project Management Division

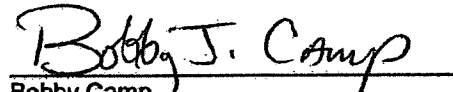
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Date

  
Larry O. Rogers, P.E.  
Chief, Engineering and Construction Division

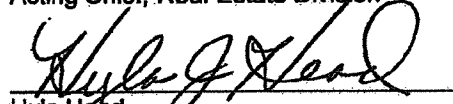
1 Feb 05  
Date

  
William Fickel, Jr.  
Chief, Environmental Division

1 Feb 2005  
Date

  
Bobby Camp  
Acting Chief, Real Estate Division

1 Feb 2005  
Date

  
Hyla Head  
Acting Chief, Operations Division

1 Feb 2005  
Date

  
Maureen Q. Taylor  
Chief, Contracting Division

1 Feb 05  
Date

# Appendix A

## Sulphur River Basin Feasibility Study Scope of Studies

This section of the Project Management Plan (PMP) provides a definition of the products and a description of the tasks to be accomplished during the course of the study. Four major products are anticipated: (1) Feasibility Report; (2) Design Agreement; (3) Preliminary Project Cooperation Agreement; and (4) an update to the Project Management Plan to address the design and implementation of the Recommended Project. These major products are then divided into tasks at varying levels of detail.

The majority of this appendix is devoted to the first major product, the Feasibility Report. Descriptions of each feasibility study task, including the technical studies and investigations to be accomplished, and the organizational elements responsible for performance of each task are included in the discussion. Also, relationships and dependencies between tasks are addressed in Appendix C, Study Schedule.

This scope of services is specific to the study, and has been developed with a limited amount of available information. Assumptions were made which may or may not prove to be accurate as the feasibility study progresses. In those cases where the assumptions are found to be significantly inaccurate, revisions to the PMP may have to be undertaken to account for the inaccuracies.

The organization and description of feasibility study tasks generally follow the U.S. Army Corps of Engineers Civil Works Breakdown Structure (CWBS) definitions as provided in March 2004. The CWBS follows a hierarchical organization and provides a breakdown of products, sub-products, major tasks/work elements, and tasks/activities required to produce a feasibility study with increasing levels of detail and specificity.

### **Product 22000 – FEASIBILITY STUDIES**

A feasibility study is the second phase of the Corps of Engineers planning process and follows the execution of a Feasibility Cost Sharing Agreement (FCSA) between the Corps of Engineers and the non-Federal sponsor. A Feasibility Report documents the planning, engineering, design and real estate activities required to provide a basis for a decision on Federal participation in the construction of a project.

The Feasibility Report is a complete decision document, which presents the results of only this feasibility study and provides the basis for recommending authorization for the construction/implementation of a project, and preparation of a Design Documentation Report and Plans and Specifications during the Preconstruction, Engineering, and Design (PED) phase. The Feasibility Report will present recommendations for Federal action.

For potential reallocation studies to be conducted in Phase II of the study, Engineering Regulation (ER) 1105-2-100 states that reallocation or addition of storage that would have a severe effect on other authorized purposes or that would involve major structural or operational changes requires Congressional approval. Providing the above criteria are not violated, 15 percent of total storage capacity allocated to all authorized project purposes or 50,000 acre-feet, whichever is less, may be allocated from storage authorized for other purposes or may be added to the project to serve as storage for municipal and industrial water supply at the discretion of the Commander, USACE. For reallocations up to 499 acre-feet the Commander, USACE has delegated approval authority

to the Division commanders. Reallocations that exceed the Commander's authority may be approved at the discretion of the Secretary of the Army if such reallocations do not require Congressional approval as described above.

The Feasibility Report will be prepared in accordance with the guidance contained in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (1983) and Guidance for Conducting Civil Works Planning Studies (ER 1105-2-100, 22 April 2000).

### **Sub-Product 22T00 Feasibility Programs and Project Management**

The Project Manager (PM), non-Federal Sponsor, and non-Federal Sponsor Designees will attend meetings and keep up-to-date on study progress and issues. The PM will be responsible for status reports, fact sheets, and budgetary efforts, with assistance from a Program Analyst.

Study budgeting and accounting will require monitoring of study expenditures by the Government. Budget documentation will consist of the project cost estimates, benefit estimates, study cost estimates, and related project information sheets needed to support budget requests. Monitoring and managing of study funds will require preparation of monthly obligations and expenditures schedules and monthly fund obligation projections; regular continuing review of progress relative to expenditures; monthly review and reconciliation of actual and planned charges by the Government, the non-Federal Sponsor and non-Federal Sponsor Designees (work-in-kind); coordination of progress on funds obligations and expenditures with higher headquarters; and negotiations, transfer of funds, and monitoring expenditures for U.S. Fish and Wildlife Service studies. At the end of the study year, an accounting of the funds expended in each study activity will be prepared and submitted to the Study Management Team for review. Study budgeting and accounting will also require preparation of annual budget documentation. Budget documents will be updated periodically during the study in support of budget reviews and to reflect changing interest rates or cost estimates.

For purposes of the schedule and resource estimates, the following activities will also be shown and funded under the 22T00 WBS code:

1. Meetings (funds for this activity will be provided to team members not actively involved in technical work during a specific phase, but who need to attend meetings to maintain awareness of study progress/direction)
2. Travel
3. Vehicles

### **Sub-Product 22P00 Engineering and Design / Cost Estimating**

An Engineering Appendix will be prepared that supports the alternative analysis and the recommended plan as shown in the Feasibility Report. The Engineering Appendix will be prepared at a level of detail necessary to develop a defensible baseline cost estimate that addresses all pertinent cost factors with adequate contingency factors. The Engineering Appendix will document the results of all of the engineering investigations conducted during the feasibility phase, including: surveying and mapping; hydrology and hydraulics studies; geotechnical investigations; site investigations; design analysis; and cost estimating. The Engineering Appendix will be prepared as a collaborative effort between the Fort Worth District's Engineering and Construction Division (or their Contractor), the non-Federal Sponsor (or their Contractor), and the non-Federal Sponsor Designees, and will be scheduled for completion in

time to be incorporated into the draft Feasibility Report. The schedule of required engineering technical investigations is detailed below. All of these tasks will be incorporated into, and be a part of, the Engineering Appendix.

### ***Major Task - WCC 22N0K Surveying and Mapping***

#### **Phase I (Existing and Future Without-Project Conditions):**

The following activities will be conducted during Phase I:

1. Gather existing (recent and historical) aerial photography of the study area.
2. Obtain updated topographic mapping with two-foot contour intervals within specified portions of the study area for use in developing the hydraulic model and for economic analysis activities.
3. Provide supplemental ground survey of the aerial mapping effort, including cross section surveys at up to 25 locations along the river. Elevations for structures within the study area will be developed from the contour map with visual adjustment for finished floor elevations, if needed.
4. Develop a new volumetric survey of Wright Patman Lake to be used to address sedimentation rates.

#### **Phase II (Plan Formulation):**

For Phase II, additional floodplain mapping may be required for detailed civil and hydraulic design and for economic analysis activities. The extent to which detailed surveying and mapping activities are required will be assessed at the end of Phase I and reflected in the updated PMP that will be prepared at that time.

### ***Major Task – WCC 22J0K Hydrology and Hydraulics***

A report will be prepared that details the results of hydrologic and hydraulic (H&H) studies conducted during this feasibility study. It is anticipated that most hydrologic and hydraulic activities will be performed by the non-Federal Sponsor (or its Contractor) in consultation with the non-Federal Sponsor Designees, with review and guidance provided by the Corps. H&H analyses for potential modifications and/or reallocations at existing reservoirs will be conducted by the Corps (or its Contractor). These activities are summarized below, by Phase.

#### **Phase I (Existing and Future Without-Project Conditions):**

1. Obtain existing Water Availability Model (WAM) used by the State of Texas in water rights deliberations, to be used for the review of yields and water rights issues related to various alternatives.
2. Update period of record for SUPER model. Identify operating protocol and associated critical yield for existing top of conservation pool at Wright Patman Lake.
3. Gather current operating rules and requirements for existing reservoirs.
4. Develop calibrated hydrologic and hydraulic flood models of the Sulphur River basin from Jim Chapman Lake on the South Sulphur River and an appropriate upstream boundary (near the proposed Ralph Hall Lake) on the North Sulphur River downstream to Wright Patman Dam,

using the developed contour map and the field-surveyed cross sections and which considers all releases and spills from the proposed Ralph Hall Reservoir.

- Develop frequency flow estimates under existing conditions
  - Develop model such that it can be used to evaluate existing conditions and identified alternatives within the framework of the economic and environmental computer models.
  - Develop models to provide input into existing Corps models that evaluate flood control impacts downstream from Wright Patman Lake related to reservoir modifications/reallocations.
5. In conjunction with other technical disciplines, identify existing flood damage problems, such as the following:
- Current flood damage sites:
    - Damages to Highway 37 bridge
    - Loss to agricultural interests
    - Increased agricultural production costs (e.g., due to pumping requirements)
    - Increased flood durations
    - Erosion problems caused by increased velocities within the river channel, which have contributed to the “logjam”
    - Erosion threat to existing bridges within the basin
  - Trends in damages as conditions continue to deteriorate
6. Participate in team meetings
7. Prepare summary document for Phase I, to be incorporated into the Existing and Future Without-Project Conditions Analysis package, in anticipation of the Feasibility Scoping Meeting (FSM)

**Phase II (Plan Formulation):**

1. The objective of this work is to develop, analyze, compare and select alternatives that reduce the depth, duration, velocity and frequency of flooding; increase opportunities for ecosystem restoration; and, increase opportunities to develop additional yield from the Sulphur River basin. It is estimated that the alternatives may include, but not limited to, the following:

Flood Damage Reduction:

- No Action
- Diversion channels
- Acquisition of floodplain property
- Channel modifications
- New and/or improved levees
- Detention reservoirs

Ecosystem Restoration:

- No Action
- Reestablishment of meanders and oxbows
- Reforestation and forest management
- Constructed wetlands

Water Quality/Availability:

- No Action
- Reallocation of storage in Wright Patman Lake
- System Operation of existing Corps reservoirs

- New reservoir sites
- Operational changes of existing reservoirs to improve water quality

More specifically, the first alternative for reallocation of flood control storage to water supply in Wright Patman Lake, over and above the previously authorized 120,000 acre-feet, will be in an amount sufficient to fully satisfy the need of 619,100 acre-feet per year, as identified in the 2002 State Water Plan.

For reallocation alternatives, the following activities will be conducted:

- Compute critical yield for the period of record for alternative conservation pool elevations, identified at the conclusion of Phase I.
- Develop pool elevation-frequency curves using critical yield for each alternative.
- Develop pool elevation-duration-frequency curves using critical yield for each alternative.
- Determine year 2020 water use/demand
- Estimate sediment storage for year 2060
- Compute wind, wave and fetch for wave run-up on the dam and shoreline for each alternative
- Develop new stage-damage functions for each alternative
- Develop floodplain delineations for new upstream and downstream stage-damage functions
- Develop and run antecedent flood series for the Probable Maximum Flood for existing conditions and each alternative under current USACE criteria

Lesser reallocation amounts will be investigated, as required, to maximize the amount of reallocation, while being consistent with the objective of identifying the most economically and environmentally feasible water supply alternative.

Alternatives to reallocation will include, but will not be limited to, potential new reservoirs within the Sulphur River Basin; combinations of varying amounts of reallocation and new reservoir sites; and system operation of existing reservoirs. The comparison between reallocation and other alternatives will take into consideration all costs that the user would incur to obtain comparable quantity and quality of water to the same location, including treatment and transmission costs; intakes, pipelines, and pump stations; relocation of utilities, roads and recreation facilities; mitigation for adverse impacts to environmental and cultural resources; real estate acquisition; and operations and maintenance.

2. Participate in team meetings
3. Prepare a summary document for Phase II, to be incorporated into the Plan Formulation Report, in anticipation of the Alternative Formulation Briefing (AFB).
4. Respond to AFB comments.

**Phase III (Feasibility-Level Design and Feasibility Report):**

1. Develop final hydrology models for the chosen alternatives
2. Develop final hydraulic models for the chosen alternatives
3. If a reallocation alternative is recommended, develop pool elevation- and inundation-frequency curves
4. If a new reservoir alternative is recommended, document the location and size of the impoundment necessary to provide the required amount of yield available to Region C.

5. For new and/or reallocated reservoirs perform the following:
  - Compute wind, wave and fetch for wave run-up on the dam and shoreline
  - Develop enveloping curves
  - Distribute year 2050 sediment storage between new conservation pool and flood control pool
  - Compute yield for year 2050 sedimentation
  - Develop floodplain delineations for new upstream and downstream stage-damage functions
  - Develop and run antecedent flood series for the Probable Maximum Flood for existing conditions and the chosen alternative under current USACE criteria
6. Develop new plans of regulation for the chosen alternative
7. Prepare the draft Hydrology and Hydraulics portion of the Engineering Appendix, suitable for incorporation as an appendix to the Feasibility Report
8. Respond to technical, policy and public review comments, and make revisions as required.

### ***Major Task – WCC 22K0K Geotechnical Studies / Site Development***

Geotechnical investigations and reports will be accomplished in accordance with guidance provided in EM 1110-1-1804, dated 29 February 1984, subject: Geotechnical Investigations, and in ER 1110-2-1150, dated 31 August 1999, subject: Engineering and Design for Civil Works Projects. Sufficient geologic and soils information shall be obtained, analyzed, and presented to support the project design and baseline cost estimate. Additional foundation exploration and testing required during the construction phase shall be identified. Subsurface investigations shall also include investigations of potential borrow and placement areas, if necessary.

It is anticipated that geotechnical activities will be performed as a cooperative effort between the Corps (or their Contractor), the non-Federal Sponsor (or their Contractor), and the non-Federal Sponsor Designees. The geotechnical studies and activities are summarized below, by Phase.

#### **Phase I (Existing and Future Without-Project Conditions):**

1. Review and evaluate available areal and site-specific geological, hydrogeological, and soils information (potential sources of information include: United States Geological Survey, Natural Resource Conservation Service, Bureau of Economic Geology; previous reports and studies; and, logs of borings drilled by public and private design entities, e.g. Texas Department of Transportation).
2. Perform site visits necessary to document (with maps, photographs, and text) existing site conditions with respect to geotechnical design considerations.
3. In conjunction with other technical disciplines, identify potential erosion threats to existing bridges within the basin
4. Participate in team meetings

### **Phase II (Plan Formulation):**

1. Develop geotechnical design parameters for the design of flood damage reduction, ecosystem restoration, and water availability alternatives including new reservoirs. No boring or lab testing is included in this estimate for Phase II. However, if the PDT determines that field investigations are necessary for an adequate evaluation of the alternatives, the PMP will be updated to reflect the cost and schedule for these additional investigations.
2. Analyze the impacts of reallocation on the geotechnical design of the embankment/dam at Wright Patman Lake.
3. Analyze impacts of reallocation on shoreline erosion and design erosion protection features, if warranted.

### **Phase III (Feasibility-Level Design and Feasibility Report):**

1. Conduct geotechnical field investigations and laboratory testing of soil and rock samples, as follows:
  - Geotechnical Field Investigations. All geotechnical field investigations shall be accomplished in accordance with the aforementioned ER and EM, and with EM 1110-1-1906, dated 30 September 1996, subject: Soil Sampling. Exploratory drilling is required at all site areas to be reported in the study and design documents. In particular, borings should be drilled at 3,300-foot (maximum) spacings along proposed levee alignments and 2,500-foot spacings along proposed swale/borrow area alignments. Borings along the levee alignment should be drilled to a (minimum) depth equivalent to proposed levee height at that location. Borings should also be drilled at the locations of other major structural features (e.g., bridge modifications, stoplog structure locations, etc.). If any channel modifications are recommended, borings should be drilled along the proposed channel modification alignment. Borings should be drilled at locations and spacings to provide sufficient information regarding structural feature bearing materials and the excavation material types and quantities for construction cost estimation purposes. Logs of borings shall be prepared for every test hole drilled during the field investigation(s) and shall incorporate all information specified in Paragraph 13-3, Written Record, of EM 1110-1-1906. A sufficient number of representative soil and rock samples shall be collected for laboratory testing to provide adequate information on subsurface material types and properties for the geotechnical design of project features.
  - Laboratory Testing of Soil and Rock Samples. Laboratory testing of soil and rock samples shall be accomplished at a testing laboratory inspected and approved by the Fort Worth District. Soil and rock samples shall be tested in accordance with methods specified by the American Society for Testing and Materials, EM 1110-2-1906, dated 30 November 1970, subject: Laboratory Soils Testing, and the U.S. Army Corps of Engineers Rock Testing Handbook, dated 1993.
2. Prepare the Geotechnical portion of the Engineer Appendix, suitable for incorporation as an appendix to the Feasibility Report. The geotechnical report should be prepared at a level of detail sufficient to support the project design and cost estimates. The following items should be included in the geotechnical report:
  - A description of the regional geologic, soils, and seismologic conditions, to include descriptions of the local topography, thickness and engineering character of overburden soils, description of rock types, geologic structure, rock weathering, local groundwater conditions, special foundation conditions such as excavation or dewatering problems, low strength foundations, identification of any cavernous foundation rock in proximity to

structural features, description of possible borrow areas and quarries, and accessibility of sources of construction materials. Perform slope stability analyses and other structural foundation analyses for project features, as appropriate. Note sources of all information provided.

- A description of the subsurface investigation(s) performed.
  - A description of laboratory testing performed on soil and rock samples, and provide descriptions and copies of the results of laboratory testing (i.e., the testing data). The report should discuss the engineering characteristics of soil and rock encountered.
  - Conclusions and recommendations of geotechnical parameters for project design and construction considerations.
  - Exhibits (e.g., CADD drawings) depicting boring location maps, geologic and soil profiles, and logs of borings.
3. Respond to technical, policy and public review comments, and make revisions as required.

### ***Major Task – WCC 22P0K Engineering and Design Analysis***

Civil and structural design studies required for the Feasibility Report consist of design support during Phase II, and the development of an Engineering Appendix, including design plates, a written description of the selected plan, and a cost estimate of the recommended improvements. All components of the study alternatives shall be analyzed in a professional manner using accepted engineering practices and CADD standards, all in accordance with Corps of Engineers' regulations applicable to a civil works project. All channel design and agronomy criteria used shall be in accordance with the following Engineering Manuals (EM), as applicable:

EM 1110-2-38	Environmental Quality in Design of Civil Works Projects, dated 3 May 1971
EM 1110-2-1601	Hydraulic Design of Flood Control Channels, dated 30 June 1994
ETL 1110-2-340	Structural Design of Reinforced Concrete U-Shaped Channels, Basins, And Drop Structures, Dated 31 March 1993.
EM 1110-2-2007	Structural Design of Concrete Lined Flood Control Channels, dated 30 April 1995.
EM 1110-2-2104	Strength Design for Reinforced Concrete Hydraulic Structures, dated 30 June 1992.
EM 1110-2-2000	Standard Practice for Concrete for Civil Works Structures, Change 2, dated 31 March 01.
EM 1110-2-2502	Retaining and Flood Walls, dated 29 September 1989.
EM 1110-2-2102	Water Stops and Other Preformed Joint Materials for Civil Works Structures, dated 30 September 1995.
EM 1110-2-2902	Conduits, Culverts, and Pipes, dated 31 March 1998.

These and other reference materials are located on the Corps of Engineers (Headquarters) website, [www.hq.usace.army.mil](http://www.hq.usace.army.mil).

It is anticipated that the civil and structural design activities will be performed as a cooperative effort between the Corps (or their Contractor) and the Non-Federal Sponsor, non-Federal Sponsor Designees (or their Contractor). These activities are summarized below, by Phase.

#### **Phase I (Existing and Future Without-Project Conditions):**

1. Obtain available data on existing infrastructure (utility lines, bridges, etc.).

2. Review existing relocation agreements at Wright Patman Lake
3. Review existing dam/reservoir as-built plans
4. Participate in team meetings

**Phase II (Plan Formulation):**

1. Develop and provide preliminary designs and quantities for the investigated flood damage reduction and ecosystem restoration alternatives.
2. Develop designs for the relocation of roads, bridges, utilities, and other existing structures at any new reservoir sites and at Wright Patman Lake for reallocation alternatives. This effort does not include designs for recreation features and facilities that will be relocated. The design for recreation features will be performed by Operations Division personnel under Sub-Product 22M00 – All Other Feasibility Activities, Major Task – WCC 22M0K, Recreation Studies. It is assumed that reallocation studies in Phase II will not require structural modifications to the existing embankment/dam or outlet works. If this assumption proves incorrect, the estimates for labor and time provided herein will be revised accordingly.
3. Develop quantity estimates and other items necessary to develop costs for relocations (except recreation features) required for reallocations.
4. Develop preliminary designs and quantities for alternatives to reallocation (e.g., new reservoir sites, pipelines, etc.). The comparison between reallocation and alternatives to reallocation will take into consideration all costs that the user would incur to obtain comparable quantity and quality of water to the same location, including treatment and transmission costs.
5. Prepare a summary document for Phase II, to be incorporated into the Plan Formulation Report, in anticipation of the Alternative Formulation Briefing (AFB).
6. Respond to AFB comments.

**Phase III (Feasibility-Level Design and Feasibility Report):**

1. Prepare design plates consisting of plan and profile sheets of the design features (channel, levees or floodwalls, etc.), typical cross sections, and miscellaneous details. All plates shall include horizontal alignment criteria in plan view, vertical control information in profile view, right-of-way, turbing areas, and construction dimensions and legends. All utilities to be relocated and necessary bridge improvements for the selected plan shall be shown in their existing locations. Relocations necessary for implementation of the selected plan shall be coordinated with the utility owners.
2. Prepare the Civil Design and Structural Design portions of the Engineering Appendix, suitable for incorporation as an appendix to the Feasibility Report.
3. Respond to technical, policy and public review comments, and make revisions as required.

## **Major Task – WCC 22P0K Cost Estimates**

### **Phase I (Existing and Future Without-Project Conditions):**

No specific cost engineering activities are anticipated in Phase I. However, updates to feasibility study cost estimates will be made at the end of Phase I, in conjunction with updates to the PMP.

### **Phase II (Plan Formulation):**

1. Develop preliminary construction cost estimates to support plan formulation and screening of alternatives. Comparative cost estimating techniques will be used to support alternative screening and preliminary benefit-cost analyses.
2. Develop preliminary preconstruction engineering and design (PED) cost estimates for alternatives
3. Develop preliminary operation and maintenance, replacement, repair and rehabilitation (OMRR&R) costs for alternatives
4. Prepare a summary document for Phase II, to be incorporated into the Plan Formulation Report, in anticipation of the Alternative Formulation Briefing (AFB).
5. Respond to AFB comments

### **Phase III (Feasibility-Level Design and Feasibility Report):**

The following major tasks will be performed during Phase III, and includes all deliverables required to prepare life cycle project cost estimates needed to support the Feasibility Report, and to prepare the baseline project cost estimate. Cost estimates will be developed in accordance with the guidance contained in ER 1110-2-1302, Civil Works Cost Engineering, using the Micro Computer Aided Cost Engineering System (M-CACES). Cost estimates will be presented in the Civil Works Breakdown Structure (CWBS) format. Cost estimates will include both Federal and non-Federal costs for construction, real estate, engineering and design, construction management, environmental, cultural resources and HTRW investigations and remediation, operation and maintenance, replacement, repairs and rehabilitation for the recommended project. Revisions to the estimates prepared for the draft report and comparative cost estimates used for alternative analysis will also be included. In addition, this product will include an estimate of the cost of the preparation of cost estimate updates during the Preconstruction Engineering and Design (PED) phase.

1. Develop project cost estimates. Detailed feasibility level cost estimates will be prepared for the final set of selected alternatives. Detailed cost estimates will be prepared in M-CACES and will be documented with notes to explain the assumed construction methods, crews, sources of materials, and other specific information. Labor costs will be based on the prevailing Davis-Bacon wage rates for each trade. Equipment costs will be based on EP 1110-1-8, Construction Equipment Ownership and Operation Expense Schedule. Contingencies will be developed and applied where areas of uncertainty exist. Detailed costs for all of the non-construction cost items (lands and damages, construction management, etc) will be provided by the appropriate District offices and incorporated into the estimate.
2. Develop preconstruction engineering and design (PED) cost estimate. The Preconstruction Engineering and Design (PE&D) cost estimate will include all Federal costs for preconstruction, engineering and design from the date of the Division Commander's Notice to the award of the first Federal construction contract. It is anticipated that this task will be

coordinated by the District Cost Engineering Section, with input from each District element responsible for a portion of the PED investigations.

3. Develop operation, maintenance, rehabilitation, repair, and replacement (OMRR&R) cost estimate for the selected plan(s).
4. Develop a baseline fully funded cost estimate for the selected plan(s). A fully funded cost estimate will be prepared for the Recommended Plan based on the project cost estimate. The project cost estimate will be updated, revised, and escalated for inflation through completion of the project. The fully funded cost estimate will be used to support the Project Management Plan (PMP) and upward reporting requirements. It is anticipated that this task will be performed by the Corps (or its Contractor).
5. Prepare the Cost Engineering portion of the Engineering Appendix, suitable for incorporation as an appendix to the Feasibility Report. The Cost Engineering portion of the Engineering Appendix will include a written description of the methodology used in the development of the baseline cost estimate. The appendix will also include a description of the scope of the projects included in the estimate and a description of the potential risk associated with the estimate. Estimates will include both Federal and non-Federal costs for construction, real estate, engineering and design, cultural resources, construction management, HTRW investigations and remediation of potential project impacts. It is anticipated that this task will be performed by the Corps (or its Contractor).
6. Respond to technical, policy and public review comments, and make revisions as required.

## **Sub-Product 22C00 – Socio/Economics**

### ***Major Task – WCC 22G0K – Economic Analysis***

Socioeconomic studies will be performed in compliance with the requirements of ER 1105-2-100. The purpose of socioeconomic studies is to assist in problem identification, to characterize the social and demographic characteristics of the affected populations, and to quantify benefits and costs of proposed solutions.

It is anticipated that these activities will be accomplished by the Corps (or its Contractor). These activities are summarized below, by Phase.

#### **Phase I (Existing and Future Without-Project Conditions):**

1. In conjunction with other technical disciplines, identify existing flood damage problems, such as the following:
  - Current flood damage sites:
    - Damages to Highway 37 bridge
    - Loss to agricultural interests
    - Increased agricultural production costs (e.g., due to pumping requirements)
    - Increased flood durations
    - Erosion problems caused by increased velocities within the river channel, which have contributed to the “logjam”
    - Erosion threat to existing bridges within the basin
  - Trends in damages as conditions continue to deteriorate
2. Identify areas of current timber industry activities.
3. Develop economic data needed for development of baseline economic models:
  - Estimates of depth-damage relationships

- Affected properties and their values
  - Affected utilities, roads, and other infrastructure
4. Develop estimates of Expected Annual Damages under baseline and Future Without-Project conditions, taking into account the increasing trend of damages.
  5. Participate in team meetings
  6. Prepare summary document for Phase I, to be incorporated into the Existing and Future Without-Project Conditions Analysis package, in anticipation of the Feasibility Scoping Meeting (FSM)

**Phase II (Plan Formulation):**

1. Participate in formulation of structural and non-structural flood damage reduction alternatives.
2. Determine residual flood damages for each flood damage reduction alternative investigated. For each alternative, corresponding benefits/outputs will be identified.
3. Annualize benefits and costs, and determine benefit-to-cost ratios (BCR) and net economic benefits for each flood damage alternative, and prepare tables for comparative analysis of alternatives.
4. For water availability alternatives, document water demand analysis. It is anticipated that this analysis of average daily water demand during drought conditions, and the expected increase in demand over the period of the study, will be provided by the non-Federal Sponsor(or their contractor), in consultation with the non-Federal Sponsor Designees. The analysis will be summarized in the text of the report, and included in its entirety as an appendix.
5. Analyze alternative sources of water that could provide the same quantity and quality of water as the reallocation. These alternatives will likely include “no action”, wells, and/or a pipeline from a new reservoir. The costs of these alternatives are considered to be the “benefits” associated with reallocation of storage.
6. Conduct a test of financial feasibility by comparing the cost of the Federally reallocated storage to the most likely alternative water supply source. This comparison will be based on the appropriate interest rate and repayment period, and will take into consideration all costs that the user would incur to obtain comparable quantity and quality of water to the same location, including treatment and transmission costs.
7. Determine impacts of reallocation on other project purposes. These impacts include, but are not necessarily limited to, flood control benefits foregone; lost hydropower benefits; and, impacts on recreation opportunities.
8. Prepare a summary document for Phase II, to be incorporated into the Plan Formulation Report, in anticipation of the Alternative Formulation Briefing (AFB).
9. Respond to AFB comments

**Phase III (Feasibility-Level Design and Feasibility Report):**

1. Determine final economic benefits for selected plan(s)
2. Perform a financial capability analysis to determine the sponsor's ability to afford the proposed project.
3. Prepare the Economics portion of the Socio-Economics Appendix, suitable for incorporation as an appendix to the Feasibility Report.
4. Respond to technical, policy and public review comments, and make revisions as required.

***Major Task – WCC 22C0K Social Studies/Report***

**Phase I (Existing and Future Without-Project Conditions):**

No activities are anticipated for this major task in Phase I.

**Phase II (Plan Formulation):**

During Phase II, the existing social, economic and demographic conditions of the study area, and the specific project area (to the extent possible) will be documented by the Corps.

Social impacts will be evaluated on the regions, communities and groups within the zone of influence of the project(s). Impacts to be considered will include: income distribution; employment distribution; population distribution and composition; the fiscal condition of the state and local governments; the quality of community life; life, health, and safety factors; displacement; long-term productivity; and energy requirements and energy conservation. Impacts to minorities and low-income groups will also be evaluated and incorporated into the environmental justice analysis in the Socio-Economics Appendix and NEPA document.

**Phase III (Feasibility-Level Design and Feasibility Report):**

1. Prepare the Social Studies portion of the Socio-Economics Appendix, suitable for incorporation as an appendix to the Feasibility Report.
2. Respond to technical, policy and public review comments, and make revisions as required.

**Sub-Product 22H0K Real Estate**

All written real estate memoranda, opinions, reports and other documents will be prepared as required on a project-by-project basis.

**Phase I (Existing and Future Without-Project Conditions):**

1. Compile current real estate maps for known sites of interest
2. Obtain rights of entry, as necessary, for purposes of environmental investigations, cultural assessments, surveys, exploration, etc., as necessary. Documentation will be prepared which provides evidence that permission from a landowner to temporarily use his/her land for a specific time and purpose was obtained. It is anticipated that this task will be performed by the Corps' Real Estate personnel (or its Contractor).
3. Attend PDT meetings

### **Phase II (Plan Formulation):**

1. An initial set of maps and drawings will be prepared that delineate the real estate acquisition lines based on technical design drawings developed by the Engineering Division during the feasibility phase. Maps and drawings will reflect the minimum real estate required for project purposes.
2. Develop preliminary real estate assessments for the alternatives investigated. These assessments will likely be derived from existing tax appraisal district data, and will be used for the purpose of developing costs for the comparative evaluation of alternatives.
3. Prepare a summary document for Phase II, to be incorporated into the Plan Formulation Report, in anticipation of the Alternative Formulation Briefing (AFB).
4. Respond to AFB comments

### **Phase III (Feasibility-Level Design and Feasibility Report):**

#### ***Major Task – WCC 22H1K Real Estate Supplement/Plan***

A Real Estate Supplement will be prepared as an appendix to the Feasibility Report that outlines the minimum real estate requirements for the proposed project, in accordance with ER 405-1-12, Draft Chapter 12. The Real Estate Supplement (RES) contains a description of the area; the acreage and proposed estates, including non-standard estates, and reasons therefore; a discussion of any land owned by the Federal government, the Local Sponsor or any public entity; an estimate of the Public Law 91-646 relocations; the Baseline Cost Estimate for Real Estate; a discussion of the Local Sponsor's ability to acquire Lands, Easements, Rights-of-Way, Relocations and Disposal area (LERRD); a discussion of mineral activity, if any, and the attitude of the landowner; a detailed schedule of land acquisition; a preliminary assessment of the facilities/utilities to be relocated; and any other relevant real estate information appropriate for the project.

#### ***Major Task - WCC 22H2K Gross Appraisal/Report***

The Corps' Real Estate personnel will evaluate the project area and conduct a Gross Appraisal. A detailed, supported appraisal of the collective real estate requirements and impact of the project, or selective portion thereof, including review and approval, will be performed as required by ER 405-1-12, (Chapter 4 and Draft Chapter 12) and policy guidance. Integral to this the work is the preparation of a Baseline Cost Estimate for Real Estate in M-CACES format and a Real Estate Supplement (RES). These items are required for inclusion in the final report. Preparation of the Gross Appraisal will involve a detailed accounting of property ownership, property evaluation for possible easement rights or acquisition of impacted project lands, preparation of a Gross Appraisal, and assessment of project LERRD requirements. The final RES will be provided to Project Management and incorporated into the PMP. Real Estate representatives will also attend meetings and conferences with the non-Federal Sponsor when necessary. The Real Estate Division will also be involved in preparing, modifying and revising the Project Cooperation Agreement (PCA) in cooperation with the non-Federal Sponsor, non-Federal Sponsor Designees, study manager, project manager, and all other affiliated or concerned agencies.

## ***Major Task - WCC 22H5K Preliminary Attorney's Opinion of Compensability***

A preliminary legal opinion will be prepared on whether provision of a substitute facility is required under the Fifth Amendment as compensation for a facility/utility being acquired for the project. The opinion makes findings on whether the owner has a compensable interest, whether the owner has the legal duty to continue to maintain and operate the facility/utility, and whether Federal law requires the provision of a substitute facility/utility rather than a mere payment of the market value for the property acquired. The preliminary legal opinion differs from the final legal opinion only in its acceptance as fact of the owner's statement of interest in the property, without a search of property records. It is anticipated that this task will be performed by the Corps' Real Estate personnel (or its Contractor).

Respond to technical, policy and public review comments, and make revisions as required.

## **Sub-Product 22E00 Environmental Studies/Reports**

Environmental studies will be performed in accordance with the National Environmental Policy Act (NEPA), ER 1105-2-100, ER 200-2-2, and other applicable laws, statutes, Executive Orders, and regulations. A NEPA document will be prepared to accompany the Feasibility Report. NEPA documentation will be coordinated with state and Federal environmental agencies and the public.

### **Phase I (Existing and Future Without-Project Conditions):**

1. Conduct an environmental resource inventory. Office and field work necessary to inventory, describe and evaluate environmental elements in the area of project influence shall be accomplished. A literature and data gathering search shall be performed and necessary field studies conducted to acquire information on the following environmental parameters for inclusion in the NEPA document.
  - A general description or statement of the existing air quality and noise level conditions in the immediate project area shall be prepared. Any significant problems associated with existing air quality or noise level sources in the project area shall be provided.
  - The existing water and sediment quality shall be described for the project area and downstream areas that may be affected by the project based on all available data and previous research. Available data and results of analysis shall be interpreted and a discussion prepared on principle sources of municipal, agricultural, or industrial pollution in the project area to be affected. The discussion shall include the results of any previous analyses of the physical, chemical and biological parameters, including nutrients, metals, and pesticides and the source and concentrations of each. If specific data is unavailable, water quality will be discussed in general terms based on stream and watershed conditions.
  - The existing conditions of biological resources of the project area shall be described for use in the environmental assessment. The biological elements to be addressed shall consist of the following: vegetational habitat, vegetation of significance, fish and wildlife resources, habitat of significance.
    - a) Major habitat types (e.g. brushlands, rangelands, woodlands, wetlands, etc.) within the project area shall be included. Cover or habitat types shall be listed for future analysis. A generalized discussion of habitat types shall be provided and a discussion of the important habitats shall be incorporated.

- b) Based on aerial photography, literature search, field verifications, or other means, a discussion of any rare, remnant or unique species, specimens, stands, or communities; threatened or endangered species; virgin stands; climax communities; vegetation types unusual to the region; and habitats of important native plants shall be provided. Any floral resources that should be preserved, enhanced, protected or approached with care shall be indicated. A listing of plants officially recognized or proposed by the Department of Interior (DOI), U.S. Fish and Wildlife Service (USFWS), Texas Parks and Wildlife Department (TPWD), and Texas Organization of Endangered Species, as threatened and endangered plants reported for the area shall be provided. Additionally, a detailed discussion shall be made of the relative value of habitat types identified as feeding, breeding, nesting, nursery areas, cover, resting, and as sources of nutrients for fish and wildlife.
  - c) The major mammal, bird, reptile and amphibian species groups that characterize each habitat type shall be described. This information shall be obtained primarily from the literature and other available sources and supplemented with onsite field investigations. Species of commercial and recreational importance shall be described, and their economic value shall be quantified utilizing TPWD and USFWS data and other available information.
  - d) Wildlife resources identified that should be preserved, enhanced, protected, or approached with care shall be discussed. Threatened and endangered species of actual or potential occurrence in the study area shall be discussed. The Endangered Species Act of 1973 will be strictly adhered to if any threatened or endangered species, or their habitat, are found to exist in the project area.
  - e) Aquatic resources that will be affected by the project shall be described. Fisheries and vegetational resources of the project area shall be discussed, and proposed measures for preserving and improving the quality of these areas as aquatic habitat shall be provided. Fish and macro-invertebrate species shall be discussed and available data from existing literature and TPWD and USFWS survey reports on fisheries shall be presented.
- Detailed Habitat Evaluation Procedures (HEP) analysis will be conducted to identify existing conditions around Wright Patman Lake; in the vicinity of the "logjam" downstream of Highway 37; and, in a limited number of sites along the North Sulphur River. Other areas within the study, including potential reservoir sites, will be evaluated on a lesser degree of detail in Phase I. Additional detail will be developed for specific project areas in Phase II.
2. Prepare minutes of scoping meetings. A formal record will be made of discussions with the public and resource agencies that define the environmental concerns related to the evaluation of project alternatives and the selection of the recommended plan.
  3. Coordinate with other agencies. Letters, meeting records, etc. will be prepared that document the correspondence and dialogue between agencies regarding the proposed project. It is anticipated that this task will be performed by the Environmental Section of the Fort Worth District.
  4. Conduct endangered species analysis. A comprehensive review will be conducted to assess the presence of threatened or endangered flora and fauna in the watershed. A report evaluating the potential effects of proposed projects on listed endangered/threatened species and proposed species and designated or critical habitat will be prepared and provided to the U.S. Fish and Wildlife Service for their use in their determining whether formal consultation or a conference is required.

5. Participate in team meetings
6. Prepare summary document for Phase I, to be incorporated into the Existing and Future Without-Project Conditions Analysis package, in anticipation of the Feasibility Scoping Meeting (FSM)

**Phase II (Plan Formulation):**

1. Develop and analyze alternatives for ecosystem restoration within the basin. Conduct detailed HEP analyses to determine habitat units gained from each alternative.
2. Utilize the Institute for Water Resource's (IWR) model to conduct cost effectiveness and incremental cost analyses for investigated alternatives.
3. For flood damage reduction and water availability alternatives, conduct an assessment of the beneficial and adverse environmental impacts of each alternative considered in detail. This assessment will be quantitative whenever possible. The assessment shall discuss project alternatives and impacts of project alternatives including impacts on water quality, vegetation, wildlife, fisheries, recreation, and other significant considerations.
4. Utilize HEP in cooperation with the USFWS and other agencies to develop an appropriate, justifiable impact mitigation plan. The benefits and costs of the measures shall be determined. A cost effective and incremental analysis will be conducted to determine the most cost effective environmental mitigation solution.
5. Prepare a summary document for Phase II, to be incorporated into the Plan Formulation Report, in anticipation of the Alternative Formulation Briefing (AFB).
6. Respond to AFB comments

**Phase III (Feasibility-Level Design and Feasibility Report):**

1. Prepare an Environmental Resources Appendix, suitable for incorporation as an appendix to the Feasibility Report. This appendix will document environmental studies conducted, including identification of critical elements for environmental assessment and evaluation of flood damage reduction, ecosystem restoration, and recreation.
2. An Environmental Impact Statement will be prepared, as required by the National Environmental Policy Act of 1969 (NEPA) that evaluates the impacts of project alternatives on the human environment.
3. Prepare a Section 404(b)(1) Analysis Report. A report will be prepared as required by the Clean Water Act which presents an analysis of any water quality impacts associated with the placement of fill material in the waters of the United States.
4. Obtain a 401 State Water Quality Certificate. Certification will be obtained from the State of Texas that proposed actions will not result in a violation of state water quality criteria.
5. Prepare a Record of Decision (ROD) to be signed by the Assistant Secretary of the Army (Civil Works).
6. Respond to technical, policy and public review comments, and make revisions as required.

## **Sub-Product 22F00 Fish and Wildlife Coordination Act Report**

### **Phase I (Existing and Future Without-Project Conditions):**

### **Phase II (Plan Formulation):**

1. The USFWS will review previously described projects and provide an impact assessment of the various alternatives to the Project Delivery Team. The USFWS will also review the quality of existing environmental baseline information, including terrestrial and aquatic habitat mapping for the study area.
2. The USFWS will obtain information for the planning aid letters and draft and final coordination act reports by review of published and unpublished sources, and consultation with universities, State and Federal agencies, private organizations, individual, and other sources. The literature search shall be restricted primarily to published sources, and secondarily to unpublished literature such as university theses and dissertations, private organization reports, and other sources. Field studies to acquire information for development of the environmental inventory and assessment shall be performed as necessary.
3. The USFWS will conduct the majority of their efforts with in-house resources, including the development of an interagency team for evaluation of existing habitat quality in project area and conduct impact assessment (Habitat Evaluation Procedures) for the feasible projects, and develop a habitat mitigation plan for fish and wildlife resources.
4. The USFWS will prepare planning aid letters addressing terrestrial and aquatic habitats and the fish and wildlife resources that utilize them, a draft Fish and Wildlife Coordination Act Report during this phase documenting results of their studies, including habitat descriptions, species present, threatened and/or endangered species, wetlands present, etc. The Corps of Engineers, the non-Federal Sponsor, and the non-Federal Sponsor Designees will assist the USFWS in the determination of the anticipated future conditions of the project area.
5. The USFWS will conduct an index of biotic integrity to determine the existing quality of the aquatic habitat in the study area. Additional studies will be conducted to determine the level of contaminants that have accumulated in fish tissues.
6. The USFWS will prepare a discussion of potential measures to mitigate losses to fish and wildlife resources resulting from implementation of viable alternatives. Predicted impacts to environmental resources in the area will be investigated and included in the assessment. This information shall be obtained from available documents, economic data, and consultation with local and regional sources, and supplemented by field verification and the U.S. Fish and Wildlife Coordination Act Report. Based on this report, an appropriate mitigation plan will be developed.
7. The USFWS will finalize their Coordination Act Report, considering comments from the Corps, Texas Parks and Wildlife Department (TPWD), and including refinement based upon development of final plans. The USFWS will also provide a letter of concurrence from the TPWD.

## **Sub-Product 22L00 HTRW Studies /Report**

Hazardous, toxic, and radiological waste (HTRW) investigations will be conducted in accordance with guidance provided in ER 1165-2-132. A report will be prepared which describes any HTRW occurrences within or nearby the project area. It will include a determination of the nature and extent of contamination and an analysis of the impacts of any contamination in the absence of

response actions. It will also include a preliminary identification of potential source areas, contaminant release mechanisms, exposure routes, potentially exposed populations, as well as a determination of the non-numerical risk or potential adverse health effects for the identified potential receptors, and an evaluation of the environmental consequences of all storage, use generation, and disposal on the property.

Only tasks identified in the following Major Task – HTRW Preliminary Assessment are anticipated and funded in Phase I of this study. If potential contaminants are found, the nature and extent, as well as release mechanisms, exposure routes, and risks must be determined with additional studies identified in the remainder of the Major Tasks, and will be done on site specific areas as part of Phase II of the study. It is anticipated that all activities under this Sub-Product will be accomplished by the Corps (or its Contractor).

**Phase I (Existing and Future Without-Project Conditions):**

***Major Task – WCC 22L0K HTRW Preliminary Assessment Report***

An Initial Assessment will be conducted. As appropriate, Government investigations, analyses, and documentation will generally be conducted as follows:

1. Site Reconnaissance. The project site and the general vicinity will be investigated for the presence or suspected presence of HTRW materials. The investigation will be limited to surface reconnaissance; i.e., drilling and/or lab testing will not be required. The site reconnaissance will be documented with appropriate maps, photographs, and text.
2. Municipal Records Review. Review of information and records applicable to the site of the project, including contacting the local fire department, environmental health department, electric company, and water department will be performed. The purpose of this review is to determine if violation of municipal codes have occurred on-site.
3. State Records Review. Review Texas Natural Resource Conservation Commission databases for underground storage tank facilities, leaking underground storage tank facilities, and landfill closures that may be present within a one-half mile radius from the site.
4. Federal Records Review. A review of the Environmental Protection Agency, Comprehensive Environmental Response Compensation and Liability Information System, Resource Conservation and Recovery Act and Emergency Notification System listings. The purpose of this review will be to identify the present use of HTRW materials being stored, generated, or transported in the area, or any State liens related to violations of the above acts. In addition to past use, disposal, treatment, storage, emissions, or hazardous materials in the area will be reviewed. This information will be reviewed and summarized up to a one-half mile radius from the referenced site location.
5. Review of Historical Land Use. A limited historical study of the site will be performed. Records of original tracts, if available, will be reviewed as well as other available maps. A review of past aerial photographs as pertains to land usage will be performed.
6. Review of Relevant Geological Information. Evaluation and review of available geological and hydrological information (United States Department of Agriculture, Soil Conservation Service, and United States Geological Service) will be performed.
7. Documentation. All findings will be detailed in a formal report including recommendations for further action, if required. Lists of source materials and copies of relevant reports that have been reviewed will be attached. List of agencies visited and personnel interviewed for this investigation will be provided.

**Phase II (Plan Formulation):**

***Major Task – WCC 22L0K HTRW Site Inspection Report***

No costs have been estimated for a Site Inspection due to the relatively low potential for HTRW sites. However, should potential HTRW sites be identified within the project area, a modification to the FCSA would likely be required to account for this required task. The first course of action will be to modify the design in order to avoid the contaminated site. However, if no other feasible alternatives can be identified which avoid the contamination, cost estimates will be developed and a Site Inspection (SI) will be conducted. The primary objective of the SI is to determine the presence and character of contamination identified in the Initial Assessment and estimate the nature and extent of contamination. When completed, the SI should satisfy HTRW data requirements for a feasibility-level planning study as outlined in ER 1165-2-132. The SI will include the following tasks:

1. Investigations. Sampling of soil, groundwater, sediments and/or surface water will be performed. If necessary, subsurface drilling and soil/groundwater HTRW sampling operations will be performed using a truck-mounted rotary drill, accessory equipment and necessary materials. Sampling locations will be selected based on the Initial Assessment conducted at the site. Quality Assurance / Quality Control (QA/QC) sampling and analysis will be conducted to assure proper sampling and laboratory procedures.
2. Testing. Submit samples to laboratory for analytical testing of contaminants. Sampling and testing will be done in accordance with ER 1110-1-263.
3. Site Investigation Report. This report will summarize the sampling and testing efforts; identify the location, extent and severity of contamination; and provide recommendations on avoiding or remediating the contamination, as appropriate.

***Major Task – WCC 22L0K HTRW Remedial Investigation Study/Report***

Should the conclusions of the planning process indicate that HTRW material will be impacted by construction of the project, a remedial investigation study/report will be required. However, it is not anticipated that a project will be proposed which would require HTRW remediation, and no costs have been included in the study cost estimate for such action.

This task also includes the preparation of a HTRW Appendix suitable for incorporation as an appendix to the Feasibility Report.

**Sub-Product 22D00 Cultural Resource Report**

Section 106 of the Historic Preservation Act of 1966 requires Federal agencies or project sponsors seeking Federal funding and/or permits to conduct cultural resource surveys to locate, identify, and evaluate historic and prehistoric resources in advance of project approval. It is anticipated that the following tasks, identified by Phase, will be accomplished by the Corps (or its Contractor).

**Phase I (Existing and Future Without-Project Conditions):**

1. Conduct an overview assessment of known cultural resource investigations within the study area. A detailed literature search and review of background material will be conducted, and will include both published and unpublished sources available through public libraries,

museums, universities, private organizations, and other government agencies. The historic and archaeological site files of the Texas Archaeological Research Laboratory and the Texas Historical Commission will be carefully reviewed to identify all sites previously recorded in the study area. The existing conditions information will have a restricted distribution in order to protect site location information. This information can be utilized as a planning tool in project alternative screening.

2. Prepare a brief summary of potential constraints to reallocations based on the information reviewed.
3. Revise the PMP following identification of reservoir(s) to be studied in Phase II.

### **Phase II (Plan Formulation):**

1. Evaluate the impact of alternative plans on historic properties in consultation with the State Historical Preservation Officer (SHPO). The implementing regulation, 36 CFR 800 (Protection of Historic and Cultural Properties: Regulations Implementing the Section 106 Process), for Section 106 of the NHPA was recently revised (18 May 1999). The most significant change to the Part 800 Process is the requirement to consult at a significantly increased level with Native American Indian tribal groups and other public(s), as well as ensuring any organization or individual with a demonstrated interest in the outcome of the undertaking on historic properties is invited to participate in the Part 800 Process as a consulting party. This increased consultation will need to be carefully integrated into the overall project goals and will require early consultation efforts which will have to continue through the life of the project.

In addition to meeting the requirements of Section 106 of the NHPA, the project will be subject to the potential discovery of Native American Indian human remains in this geographic region. Any remains discovered on project lands will be subject to the provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) [PL 101-601; 25 USC 3001-3013 *et seq.*]. The implementing regulation for NAGPRA is Native American Graves and Repatriation Act: Final Rule [43 CFR 10]. Any human remains discovered could cause potential delays while consultation requirements are met. Any removal of such remains will need to be completed under the authority of a permit issued per the Archaeological Resources Protection Act of 1979 (ARPA) [PL 96-95; 16 USC 470aa-mm *et seq.*] and its implementing regulation for the Department of Defense, Protection of Archeological Resources [32 CFR 229].

### ***Major Task – WCC 22D0K Site Survey Field Report***

Cultural resource investigations will be conducted based on a research strategy tailored to ensure adequate coverage of the environmental zones within the alternative plan impact areas. The site survey field report will provide information on cultural resources necessary to assist in plan formulation and evaluation. A sampling strategy will be developed in consideration of the costs of the survey with respect to the number of viable alternative plans and the extent of the known area of potential effects. This strategy will provide for the efficient planning of any further cultural resource investigations that may be needed prior to initiation of construction. If considered necessary, the sample survey may be waived in favor of an intensive survey/inventory during the feasibility phase. It is anticipated that this major task will be performed by the Corps (or its Contractor).

### ***Major Task – WCC 22D0K Data Collection and Analysis Report***

This report is a brief description of the identified and predicted historic properties that would be impacted by the alternative plans that will be included in the Feasibility Report and NEPA document. Historic resource considerations that may influence the plan recommendations will be

summarized and clearly set forth in the Feasibility Report. It is anticipated that this major task will be performed by the Corps (or its Contractor).

### ***Major Task – WCC 22D0K Mitigation Plan Report***

A mitigation plan report will be prepared, if necessary, to document the need for mitigating any adverse effects on historic properties listed or eligible for listing on the National Register of Historic Places. It will include plans and cost estimates for mitigation or other treatment of historic properties affected by the project. No funds for this task have been included in this PMP, but will be developed and negotiated with the non-Federal Sponsor and non-Federal Sponsor Designees, if necessary, when the need and extent of possible mitigation actions are defined. It is anticipated that this major task will be performed by the Corps (or its Contractor).

### ***Major Task – WCC 22D0K Memorandum of Agreement***

If the identification of historic properties and project impacts cannot be accomplished in a timely manner for consideration in a NEPA document or Feasibility Report, a Memorandum of Agreement (MOA) can be developed to specify the processes by which required surveys, testing, evaluation effects determination, mitigation planning, and coordination will be achieved.

While the typical outcome of consultation on resolving the majority of adverse effect determinations will result in the preparation of a Memorandum of Agreement negotiated between the Corps of Engineers and the Texas State Historic Preservation Officer (SHPO), the size and complexity of the overall project could require a negotiation of a more comprehensive Programmatic Agreement negotiated between the Corps of Engineers, the Texas SHPO, the Advisory Council on Historic Preservation, any participating Native American Indian tribes, or other consulting parties.

No funds for this task have been included in this PMP, but will be developed and negotiated with the non-Federal Sponsor, and non-Federal Sponsor Designees, if necessary, when the need and extent of such actions are defined. It is anticipated that this major task will be performed by the Corps (or its Contractor).

### ***Major Task – WCC 22D0K One Percent Waiver***

If mitigation costs are expected to exceed one percent of the total estimated Federal appropriation required for construction of a project, and Congress has not specifically authorized expenditures in excess of this amount, a waiver request in the form of a letter report will be submitted to the Corps' Washington Headquarters. The waiver must then be submitted to the Secretary of the Interior, through the Department Consulting Archaeologist, for concurrence and Congressional notification. It is not expected that a one percent waiver will be required for this project, and a study cost estimate has not been prepared for this task. If necessary, this major task will be performed by the Corps (or its Contractor).

### **Sub-Product 22A00 Public Involvement Documents**

Work under this sub-product will be performed by the Corps, the non-Federal Sponsor, and the non-Federal Sponsor Designees. Public involvement activities will include public meetings/workshops and agency meetings held during the feasibility study, plus other miscellaneous meetings with local officials.

## **Phase I (Existing and Future Without-Project Conditions)**

1. Coordination with state and local agencies will be initiated immediately and will be maintained throughout the study process. Public involvement includes interagency coordination between the Corps, Federal and State resource management agencies, the proposed local non-Federal Sponsor, the non-Federal Sponsor Designees, environmental and community groups, and other interested parties. Project scoping and status meetings will be held with the local non-Federal Sponsor and non-Federal Sponsor Designees. Meetings will be held to discuss data collection needs, study area water resource problems, and flood damage reduction alternatives with various organizations. Newsletters, fact sheets and/or individually written letters will be generated to keep interested parties updated on the status of the feasibility study. The Corps will provide the local non-Federal Sponsor, and non-Federal Sponsor Designees with minutes of meetings and forward appropriate information regarding the project schedule. Coordination will also be maintained with the U.S. Fish and Wildlife Service (USFWS) and the U.S. Environmental Protection Agency (USEPA).

## **Phase II (Plan Formulation):**

The remainder of the major tasks under this Sub-Product will be performed during Phase II of the study.

### ***Major Task – WCC 22A0K Notices and Public Meeting(s)***

Letters, notices, newspaper articles, and radio announcements will be used to inform the public of meetings, workshops and hearings. Meetings will be held at appropriate locations within the project area to inform the public and obtain input to the plan formulation and decision making process. This task will be performed by the Corps, in conjunction with the non-Federal sponsor, and non-Federal Sponsor Designees.

### ***Major Task – WCC 22A0K Minutes of Public Meeting(s)***

Verbal record and written transcripts of public meeting(s) will be developed and maintained on file at the Fort Worth District. This task will be performed by the Corps in conjunction with the non-Federal Sponsor, and non-Federal Sponsor Designees.

### ***Major Task – WCC 22A0K Public Comments Report***

A brief summary of the comments received during and after public meetings and workshops will be prepared and kept on file at the Fort Worth District. This task will be performed by the Corps in conjunction with the non-Federal Sponsor and non-Federal Sponsor Designees.

### ***Major Task – WCC 22A0K Newsletters***

Newsletters, if deemed desirable by the Corps, the non-Federal Sponsor, and the non-Federal Sponsor Designees will be used to provide information to the public regarding the status and findings of the study. This task will be performed Corps in conjunction with the non-Federal Sponsor, and the non-Federal Sponsor Designees.

### ***Major Task – WCC 22A0K Other Public Involvement Documents***

The results of the public involvement program will be documented in a Public and Agency Coordination Appendix to the Feasibility Report. The Appendix will document public involvement activities performed during the feasibility phase. Other public involvement work tasks will include responding to inquiries from the general public, agencies and Congressional interests; coordination with the media; briefings for various committees and private organizations; and

preparing materials, including visual aids, for meetings. This task will be performed by the Corps, in conjunction with the non-Federal Sponsor and the non-Federal Sponsor Designees.

### **Sub-Product 22R00 Plan Formulation and Evaluation Report**

Management of the plan formulation effort will include such activities as planning team meetings, upward reporting, preparation of study management documents, and coordination with the local non-Federal Sponsor, the non-Federal Sponsor Designees, and other agencies. The Project Manager will integrate and summarize the results of the technical studies for use in the draft Feasibility Report. The costs of participation in plan formulation activities by the rest of the study team are included in their technical study estimates under the appropriate Sub-Products.

#### ***Major Task – WCC 22R0K Plan Formulation***

The feasibility study will follow the planning process specified in ER 1105-2-100, and in the Water Supply Handbook (IWR Report 96-PS-4), dated December 1998. The interim feasibility study will follow the planning process specified in ER 1105-2-100. The tasks will include:

1. The specific problems and opportunities that will be addressed in the study will be identified, and the causes of the problems will be discussed and documented. Planning goals will be set, objectives will be established, and constraints will be identified.
2. Existing conditions will be identified, analyzed and forecasted. The existing condition of resources, problems and opportunities critical to plan formulation, impact assessment, and evaluation will be characterized and documented.
3. The study team will formulate alternative plans that address the planning objectives. An initial set of alternatives will be developed and evaluated at a preliminary level of detail. For flood damage reduction purposes and ecosystem restoration purposes, a variety of measures will be identified and formulated.
4. Alternative project plans will be evaluated for effectiveness, efficiency, completeness and acceptability. The impacts of alternative plans will be evaluated using the system of accounts framework specified in the Principles and Guidelines and ER 1105-2-100.
5. Alternative plans will be compared. A benefit-cost analysis (or cost effectiveness / incremental analysis) will be conducted to prioritize and rank alternatives. The public involvement program will be used to obtain public input to the alternative evaluation process.
6. A plan will be selected for recommendation and a justification for plan selection will be prepared.

The following tasks will be completed and/or coordinated by the Project Manager and/or Lead Planner, the non-Federal Sponsor's study coordinator, and the non-Federal Sponsor Designees. The costs of participation in plan formulation activities by the rest of the study team are included in their technical study estimates under the appropriate Sub-Products.

#### **Phase I (Existing and Future Without-Project Conditions):**

1. Develop and refine existing and future without-project conditions, based on data and input as described in other Sub-Products herein. For the water availability objective, specific elements included in the definition of without-project conditions are existing water supplies, existing and expected future water systems, water management contracts and operating criteria, water supplies that are under construction or authorized and likely to be construction

during the period of analysis, the probability of delivery for each source of water supply, water quality, and conservation measures.

2. Document existing and future without-project conditions. This information will be documented in a read-ahead package for the Feasibility Scoping Meeting (FSM), the first of two mandatory checkpoint meetings to be conducted during the study.
3. Conduct an Independent Technical Review (ITR) of the information contained in the FSM read-ahead package. The ITR comments and responses will be documented and included in the package.
4. Conduct the Feasibility Scoping Meeting. This meeting will include representatives from the Fort Worth District, the Southwestern Division (SWD), Headquarters (HQUSACE), the non-Federal Sponsor, and the non-Federal Sponsor Designees. This meeting is held for the purpose of obtaining concurrence in the types of alternatives to be investigated during Phase II (Plan Formulation) of the study, and to identify potential technical or policy issues that may be encountered during the study.
5. Document the discussions and conclusions of the FSM.

#### **Phase II (Plan Formulation):**

1. Formulate and conduct preliminary screening of alternatives. The Project Manager will lead the study team in identifying and screening alternative projects. Based on review of existing data and limited field reconnaissance, the study team will identify potential alternatives, develop concept level designs and cost estimates, and conduct a preliminary benefit-cost analysis of alternatives. This information, plus information obtained from the public, will be used to screen alternatives to the final set which will be subject to detailed evaluation. The preliminary set of formulated plans may include required alternatives such as a no-action plan and a non-structural plan, as well as structural measures to reduce flood damages, a select amount of ecosystem restoration measures, and various water availability alternatives.
2. Conduct detailed evaluation of alternatives. The final set of plans will be formulated from a variety of measures to display a full array of opportunities, assess their performance, identify a reliable NED and NER plan, and satisfy NEPA. As part of the formulation process, the study will consider technical feasibility, economic feasibility, environmental impact, real estate acquisition, induced flooding, and views of the public. The alternatives that pass the initial screening process by the study management team and approved by the Executive Committee will be analyzed in terms of costs, benefits and impacts to determine an NED and NER plan.
  - Flood damage reduction alternatives will be evaluated in a risk-based framework. The procedures specified in ER 1105-2-101, Planning – Risk Based Analysis for Evaluation of Hydrology/Hydraulics, Geotechnical Stability, and Economics in Flood Damage Reduction Studies, 1 March 1996, U.S. Army Corps of Engineers, will be used to evaluate the inherent hydrologic, hydraulic, and economic uncertainties and express the reliability of alternatives in terms of percent chance of failure for given flood events. A minimum of three levels of protection will be analyzed for each of the selected plans in order to bracket the NED plan. Locally preferred plans will also be evaluated, if different from the NED plan. The detailed evaluation of alternatives will be performed by the Corps, the non-Federal Sponsor, and the non-Federal Sponsor Designees.
  - Ecosystem restoration measures will be evaluated using the Institute of Water Resources (IWR) plan software to determine cost effectiveness and conduct incremental cost analyses to determine the NER plan.
  - For reallocation/water availability alternative, the analysis will be as follows:
    - a. Evaluate benefits as follows:

- Identify the study area. The study area is the area within which significant project impacts will accrue from the use of municipal and industrial (M&I) water supplies, including areas that will receive direct benefits and/or incur costs from the provision of M&I water supply.
  - Estimate future M&I water supplies and demands.
  - Identify the deficit between future water supplies and projected water use.
  - Identify alternatives without the Federal plan. Alternative plans that are likely to be implemented by communities and/or industries in the absence of a Federal plan are identified in this step. These plans should be identified through analysis of the total water resources of the region, allow for present and expected competing uses.
  - Rank and display the alternative plans based on least cost analysis. Annualized costs are calculated on the basis of the service (depreciable) life of the facility or the period of analysis, whichever is less.
  - Identify the most likely alternative. The least cost alternative is identified as the most likely alternative.
  - Compute M&I annualized benefits. The annualized benefits of the Federal supply (reallocation) plan are equal to the annualized cost of the most likely alternative.
- b. Conduct sensitivity analysis of key variables, such as cost of least costly alternative, future demand for water and future availability of water supplies.
  - c. Determine cost of storage for the reallocated storage. This cost will normally be established as the highest of the benefits or revenues foregone, the replacement cost, or the updated cost of storage in the Federal project.
  - d. Determine financial feasibility. The annual cost of the reallocated storage will be compared to the annual cost of the most likely, least cost alternative that would provide an equivalent quantity and quality of water which the non-Federal interest would undertake in the absence of utilizing the Federal project.
3. Document the results of the plan formulation efforts in a Plan Formulation Report, to be used as a read-ahead package for the Alternative Formulation Briefing (AFB), the second mandatory checkpoint meeting/conference. The Plan Formulation Report will be sent to SWD and HQUSACE at least thirty (30) days prior to scheduling the conference. The designs and costs presented at the AFB will be at a preliminary level of detail sufficient to screen alternatives and select the plans that will be subject to a detailed analysis. This activity will be performed by the Corps' Project Manager.
  4. Conduct the AFB. This checkpoint conference will be conducted in accordance with Planning Guidance Letter (PGL) 98-05, Appendix O to ER 1105-2-100 (Revised). The Alternative Formulation Briefing will be attended by the Fort Worth District, the non-Federal Sponsor, the non-Federal Sponsor Designees, the Southwestern Division, and HQUSACE. The purpose of the AFB is to review study findings concerning identified problems and needs; to evaluate the array of alternatives and determine their consistency with the Federal interest; and to review the preliminary analysis of the impacts of alternatives. This meeting will be a key decision point in determining whether alternatives meet Federal and non-Federal policies and budgetary criteria and should be recommended for project implementation. If the non-Federal Sponsor, or non-Federal Designees have a preferred alternative which differs from the Federally recommended plan, it will be identified and reviewed at this time. The AFB will be scheduled after the plan formulation, economics and engineering analyses are completed and the District has selected the recommended plan.

### ***Major Task – WCC 22R0K AFB Technical Review Documents***

Technical review documents will be prepared by the Corps' Project Manager. The Documentation and Certification of the Independent Technical Review shall be provided as part of the documentation of the Alternative Formulation Briefing.

### ***Major Task – WCC 22R0K AFB Policy Compliance Review Documents***

Policy compliance review documents will be prepared by HQUSACE. This task will be performed by HQUSACE and will be funded through GE appropriations in lieu of direct study funding.

### ***Major Task – WCC 22R0K AFB Guidance Memorandum***

A draft AFB Guidance Memorandum will be prepared by the Project Manager, documenting the discussions and conclusions of the AFB.

The final AFB Guidance Memorandum will be prepared by HQUSACE documenting directions provided to the Fort Worth District for completion of the feasibility study. This task will be performed by HQUSACE and will be funded through General Expenditure appropriations in lieu of direct study funding.

### **Sub-Product 22S00 Feasibility Report**

A Feasibility Report will be prepared following the guidance contained in ER 1105-2-100. With minor revisions, the plan formulation report will be suitable for incorporation into the Feasibility Report as the main report section. Detailed appendices will be prepared that document the results of the technical analyses. The costs of preparing report appendices are contained under each of the technical elements described previously.

### ***Major Task – WCC 22S0K Draft Feasibility Report and NEPA Documents***

The contents of the Draft Feasibility Report are summarized below:

1. Concise main report summarizing the study's technical findings, conclusions and recommendations;
2. A draft NEPA document;
3. Technical appendices presenting the detailed backup and results of individual work tasks;
4. An appendix containing the sponsor's financial capability statement and preliminary financing plan; and
5. Other supporting documentation including updates of the Project Management Plan (PMP).

Preparation of the Draft Feasibility Report includes assembling, writing, editing, typing, drafting, reviewing, reproducing and distributing the Draft Feasibility Report, Draft NEPA document and other related documentation required for transmittal to USACE and higher authorities for use as a decision document. The Draft Feasibility Report and Draft NEPA document will be prepared by the Corps. The costs of preparing the Draft NEPA document and report appendices are included under other Sub-Products.

### ***Major Task – WCC 22S0K Technical Review Documents***

An Independent Technical Review (ITR) Team will be established in accordance with the Quality Control Plan, included in this PMP. The review team will ensure that the report and technical

analyses meet the technical standards and regulations of the Corps of Engineers. All review comments will be addressed, and revisions to the report as a result of these comments, will be documented and included as part of the submittal of the Feasibility Report to higher Corps authorities.

### ***Major Task – WCC 22S0K Public Review Comments***

This task involves reviewing and preparing responses to letters received from agencies and the public in response to the Draft Feasibility Report and Draft NEPA document. Responses to the comments will be included in the Final Feasibility Report and Final NEPA document. This task will be performed by the Corps.

### ***Major Task – WCC 22S0K Project Guidance Memorandum (PGM)***

This task includes directive guidance prepared by HQUSACE for the work to be accomplished to obtain approval of the Final Feasibility Report. This task will be performed by HQUSACE and will be funded through GE appropriations.

### ***Major Task – WCC 22S0K Policy Compliance Review Documents***

Policy compliance review documents will be prepared by HQUSACE. This task will be funded through GE appropriations.

### ***Major Task – WCC 22S0K Final Report Documentation***

The Final Feasibility Report will be revised to incorporate comments from agencies, the public and higher authority review. The steps in producing a Final Feasibility Report include the following:

1. Finalize Draft Feasibility Report for internal/non-Federal Sponsor, and non-Federal Sponsor Designees review;
2. Conduct review;
3. Revise the Draft Feasibility Report in response to SWD and HQUSACE comments;
4. Modify the Draft Feasibility Report in response to comments received during the agency and public comment period;
5. Coordinate with the non-Federal Sponsor, non-Federal Sponsor Designees, and internal District elements; and
6. Reproduce and distribute the Final Feasibility Report.

### ***Major Task – WCC 22S0K Division Commanders Notice***

A public notice will be prepared to announce the completion of the Division Commander's Report, based on his endorsement of the findings and recommendations of the District Commander. The public notice will indicate that the report has been submitted for Washington Level Review. The Fort Worth District will prepare a draft of the Public Notice. It will be provided to the Division along with an appropriate mailing list. Actual mailing of the public notice will be performed by Southwestern Division.

### ***Major Task – WCC 22S0K Final Feasibility Report and NEPA Documents***

The Final Feasibility Report and final NEPA document will be prepared by Corps. The costs of preparing the Final NEPA document and the technical appendices are included under other Sub-Products. Preparation of the Final Feasibility Report will be performed by the Project Manager, in coordination with the PDT.

### ***Major Task – WCC 22S0K Washington Level Report Approval***

This Sub-Product includes all activities necessary for submittal of the Final Feasibility Report to Congress (if necessary) after completion of all levels of review. To ensure that the non-Federal Sponsor and non-Federal Sponsor Designees are afforded an opportunity to participate in any significant effort as a result of Washington level review, funding is included as a separate line item in this Sub-Product. These costs, including any necessary travel, will be limited to those reasonable costs associated with the review and processing of the Feasibility Report. In accordance with EC 1105-2-108, this item will be 5 percent of the total study cost or \$50,000, whichever is less, and will be cost shared equally between the Corps of Engineers and the non-Federal sponsor.

### ***Major Task – WCC 22S0K Chief of Engineers' Report***

A brief summary of the Feasibility Report, signed by the Chief of Engineers, will be prepared to transmit recommendations to the Assistant Secretary of the Army for Civil Works (ASA(CW)), if necessary.

### ***Major Task – WCC 22S0K OMB Letter to ASA(CW)***

If necessary, a letter will be prepared from OMB to ASA(CW) expressing the Administration's position regarding transmitting the report to Congress for authorization. This task will be performed by OMB and will be funded through other appropriations.

### ***Major Task – WCC 22S0K ASA(CW) Transmittal to Congress***

If necessary, a letter will be prepared from ASA(CW) transmitting the Feasibility Report along with ASA(CW)'s recommendation to Congress. This task will be performed by ASA(CW) and will be funded through other appropriations.

### ***Major Task – WCC 22S0K State & Agency Review and NEPA Document Filing Letters***

Letters from appropriate State and Federal regulatory agencies will be obtained by Corps and included in the final NEPA document.

## **Sub-Product 22M00 All Other Feasibility Activities**

### ***Major Task – WCC 22M0K Recreation Studies***

This work item includes tasks necessary to evaluate the impact of alternatives on recreation and related activities in the study area.

The recreational tasks may be summarized by the following:

**Phase I (Existing and Future Without-Project Conditions):**

1. Conduct an inventory of existing recreation facilities at each of the nine Corps reservoirs.
2. Prepare a list, by type and elevation, of facilities that would be impacted by each of the investigated reallocations at each reservoir.
3. Prepare summary document for Phase I, to be incorporated into the Existing and Future Without-Project Conditions Analysis package, in anticipation of the Feasibility Scoping Meeting (FSM)
4. Attend PDT Meetings

**Phase II (Plan Formulation):**

1. Develop costs for relocation of impacted recreation facilities, park roads and bridges, and service drops for utilities. This effort will be performed in coordination with Civil Design and Cost Engineering Sections.
2. Prepare a summary document for Phase II, to be incorporated into the Plan Formulation Report, in anticipation of the Alternative Formulation Briefing (AFB).
3. Respond to AFB comments.

**Phase III (Feasibility-Level Design and Feasibility Report):**

1. Prepare a technical report suitable for incorporation into the Engineering Appendix to the Feasibility Report.
2. Respond to technical, policy and public review comments, and make revisions as required.

***Major Task – WCC 22M0K Geographical Information Systems (GIS) Activities***

This activity includes costs and labor associated with maintaining the District GIS database and supporting use by team members. It is anticipated that the Corps GIS efforts will be utilized mainly for environmental, recreation, and economic evaluation purposes. It is anticipated that these activities will be accomplished by the Corps (or its Contractor).

**Phase I (Existing and Future Without-Project Conditions):**

1. Gather data from existing sources, including other agencies, universities, State, etc. for all nine reservoirs. Provide base maps for use in analysis of potential constraints due to environmental resources, recreation facilities, etc, at various reallocation levels.
2. Provide graphics support. Produce figures and graphics for use in public meetings, reports, and other presentations.
3. Attend PDT meetings

**Phase II (Plan Formulation):**

Provide GIS support for the following tasks:

1. Evaluation of Alternatives. Assist the Corps Economists in utilizing GIS to more efficiently organize and interpret the economic data for plan formulation purposes. Assess environmental impacts related to flood mitigation plans (i.e., buyouts, flood control structures, etc.) in support Environmental Studies/Analysis.
2. Development of mitigation plans. Support Environmental Studies/Analysis in mapping, analyzing, and tabulating characteristics of potential mitigation areas within context of local and regional land use patterns.

**Phase III (Feasibility-Level Design and Feasibility Report):**

3. Prepare a technical report detailing GIS methods, results and tables/graphics, suitable for incorporation as an Appendix to the Feasibility Report.
4. Respond to technical, policy and public review comments, and make revisions as required.

**Sub-Product 22X00 Damages Assessed AE Contractors**

Documents that determine and assess the liability for inadequate A-E efforts will be prepared, if required.

**Sub-Product 22Q00 Management Documents**

This Sub-Product includes all of the documents related to the management of the Feasibility Report, including A-E contract administration and in-house control.

***Major Task - WCC 22Q0K A-E Contract Documents***

This activity includes preparation of negotiation, award and contract administration documents for the utilization of A-E Contractors to complete, or assist in the completion of, feasibility phase products. The cost of obtaining A-E services are included in the study cost estimates of the technical study sub-products.

***Major Task – WCC 22Q0K Coordination Documents***

Included under this major task are: copies of letters exchanged with the local non-Federal Sponsor and non-Federal Sponsor Designees that affect study costs, scopes and/or schedules; official correspondence with higher authority on similar subjects; internal memoranda which bear on significant study elements and, in general, any other correspondence which affects significant aspects of the study. This task will be performed by the Corps.

***Major Task – WCC 22Q0K Study Funds Control Documents***

This task includes preparation and management of internal funds control documents for the allocation and management of the feasibility study. The Fort Worth District's Project Manager (PM) is ultimately responsible for managing the overall study cost, schedule, preparing present and future budget year submissions, and conducting fiscal coordination with the non-Federal Sponsor and the non-Federal Sponsor Designees. Representatives of the non-Federal Sponsor and each non-Federal Sponsor Designee will assist in project management. The Fort Worth District PM, with assistance by the non-Federal Sponsor's project manager and the non-Federal Sponsor Designees, will monitor expenditures; keep the PMP current; prepare project management reports; and report study status and issues to the District Engineer and the Project Review Board (PRB). The project management structure will continue into the PED phase.

Updates will include monthly finance and accounting reports regarding expenditures and obligations, executive summary reports for the PRB, schedule and cost changes, and changes to work elements.

This task includes preparation of budget documents and financial reports. At the end of the study a final audit will be performed. Work required to prepare a sponsor letter of intent to participate in the Preconstruction Engineering & Design and construction phases will be also be prepared under this task. This task will be performed by the Project Manager.

### ***Major Task – WCC 22Q0K All Other Management Documents***

This task includes all other appropriate management documents determined to be needed on a case-by-case basis. Following completion of the Feasibility Report, the Project Management Plan will be updated and revised to address the procedures for managing the project from the issuance of the Chief's Report through engineering, land acquisition, design, and construction until the project is turned over to the non-Federal sponsor to operate and maintain. The updated PMP will establish the roles, responsibilities, rights and obligations of the Corps of Engineers and the non-Federal sponsor during the planning, engineering design, land acquisition, and construction phases of the project. The PMP will be developed by the Project Delivery Team, led by the Project Manager.

## **PRODUCT 30DG0 DESIGN AGREEMENT**

## **PRODUCT 30B00 DESIGN DOCUMENTATION REPORT**

## **PRODUCT 30AP0 PROJECT COOPERATION AGREEMENT (PCA)**

Following completion of the Feasibility Report, the draft Project Cooperation Agreement (PCA) will be prepared to document the cost sharing aspects, relative roles and responsibilities for the project, and an analysis of the local sponsor's ability to meet their responsibilities under the terms of the PCA.

## **PRODUCT 30AQ0 PROJECT ESCROW AGREEMENT**

## **PRODUCT 30D00 CONSTRUCTION ENGINEERING AND DESIGN**

## **PRODUCT 31000 SUPERVISION & ADMINISTRATION (S&A)**